APPENDIX B. Reaction Kinetics Data

Table B-1, Part 1. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	1		2		3	
Feed Water Rate, lb-mol/hr	0.01107		0.01014		0.00459	
Feed Gas Rate, SCF/hr	3.5954		3.5806		2.6123	
Feed Benzene Rate, lb-mol/hr	0		0		0	
Feed H_2O/Gas Ratio (mol)	0.84		1.09		0.68	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.3	9.3	20.3	9.7	20.3	12.1
Carbon Dioxide	21.6	9.9	21.6	10.3	21.6	12.9
Hydrogen	27.2	12.4	27.2	13.0	27.2	16.2
Methane	28.07	12.9	28.07	13.4	28.07	16.7
Ethane	0.5	0.23	0.5	0.24	0.5	0.30
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.1	0.50	1.1	0.52	1.1	0.66
Nitrogen	1.2	0.55	1.2	0.57	1.2	0.71
Helium	0.03	0.01	0.03	0.01	0.03	0.02
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	54.21	0	52.26	0	40.41
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	525		525		525	
Reactor Pressure, psig	970		970		970	
Product Water Rate, lb-mol/hr	0.01042		0.00939		0.00307	
Product Gas Rate, SCF/hr	3.8451		3.8389		3.0023	
Product Benzene Rate, lb-mol/hr	0		0		0	
Product Gas Composition, mol %						
Carbon Monoxide	12.4	6.1	12.0	6.2	6.1	4.4
Carbon Dioxide	26.8	13.1	27.1	13.9	30.3	21.7
Hydrogen	32.02	15.7	32.37	16.6	35.47	25.3
Methane	26.2	12.8	26.1	13.4	25.8	18.5
Ethane	0.5	0.24	0.4	0.21	0.4	0.28
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.93	0.46	0.9	0.47	0.9	0.64
Nitrogen	1.12	0.55	1.1	0.58	1.0	0.72
Helium	0.03	0.01	0.03	0.01	0.03	0.02
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	51.04	0	48.63	0	28.44
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000657		0.000689		0.000902	
CO_2 Produced, lb-mol/hr	0.000659		0.000692		0.000897	
H_2 Produced, lb-mol/hr	0.000657		0.000698		0.000949	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.42		0.44		0.58	

* Feed also contains 31.4 ppm of carbonyl sulfide.

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Table B-1, Part 2. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	4		5		6	
Feed Water Rate, lb-mol/hr	0.00612		0.00684		0.01003	
Feed Gas Rate, SCF/hr	2.3214		3.6023		3.5920	
Feed Benzene Rate, lb-mol/hr	0		0		0	
Feed H_2O/Gas Ratio (mol)	1.02		0.73		1.08	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.3	10.1	20.3	11.7	20.3	9.8
Carbon Dioxide	21.6	10.7	21.6	12.5	21.6	10.4
Hydrogen	27.2	13.5	27.2	15.7	27.2	13.1
Methane	28.07	13.9	28.07	16.2	28.07	13.5
Ethane	0.5	0.25	0.5	0.29	0.5	0.24
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.1	0.55	1.1	0.64	1.1	0.53
Nitrogen	1.2	0.59	1.2	0.69	1.2	0.58
Helium	0.03	0.01	0.03	0.02	0.03	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	50.40	0	42.26	0	51.84
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	575		610		655	
Reactor Pressure, psig	985		990		980	
Product Water Rate, lb-mol/hr	0.00470		0.00618		0.00844	
Product Gas Rate, SCF/hr	2.6702		4.1724		4.2198	
Product Benzene Rate, lb-mol/hr	0		0		0	
Product Gas Composition, mol %						
Carbon Monoxide	4.7	2.8	3.6	2.3	3.4	1.9
Carbon Dioxide	31.7	18.9	32.3	20.6	32.2	18.2
Hydrogen	36.87	21.9	37.52	23.8	37.58	21.2
Methane	24.4	14.5	24.2	15.4	24.5	13.8
Ethane	0.4	0.24	0.43	0.28	0.39	0.22
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.9	0.53	0.89	0.57	0.89	0.50
Nitrogen	1.0	0.59	1.03	0.66	1.02	0.58
Helium	0.03	0.02	0.03	0.02	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	40.52	0	36.37	0	43.59
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000897		0.00151		0.001521	
CO_2 Produced, lb-mol/hr	0.000895		0.00148		0.001512	
H_2 Produced, lb-mol/hr	0.000916		0.00152		0.001590	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.58		0.97		0.97	

* Feed also contains 31.4 ppm of carbonyl sulfide.

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Table B-1, Part 3. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	7		8		9	
Feed Water Rate, lb-mol/hr	0.01062		0.01224		0.005354	
Feed Gas Rate, SCF/hr	3.5894		3.5894		3.5822	
Feed Benzene Rate, lb-mol/hr	0		0		0	
Feed H_2O/Gas Ratio (mol)	1.14		1.31	0.58	0.58	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.3	9.5	20.3	8.8	22.6	14.3
Carbon Dioxide	21.6	10.1	21.6	9.3	23.5	14.9
Hydrogen	27.2	12.7	27.2	11.8	20.77	13.2
Methane	28.07	13.1	28.07	12.1	31.0	19.7
Ethane	0.5	0.23	0.5	0.21	0.6	0.38
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.1	0.51	1.1	0.47	0.7	0.44
Nitrogen	1.2	0.56	1.2	0.52	0.8	0.50
Helium	0.03	0.01	0.03	0.01	0.03	0.02
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	53.29	0	56.79	0	36.56
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	658		660		660	
Reactor Pressure, psig	980		985		500	
Product Water Rate, lb-mol/hr	0.00893		0.01075		0.004191	
Product Gas Rate, SCF/hr	4.2494		4.2338		4.1412	
Product Benzene Rate, lb-mol/hr	0		0		0	
Product Gas Composition, mol %						
Carbon Monoxide	2.2	1.2	2.1	1.1	6.2	4.5
Carbon Dioxide	33.5	18.5	33.4	16.9	33.7	24.2
Hydrogen	38.16	21.1	38.2	19.3	31.3	22.7
Methane	23.8	13.2	23.9	12.1	27.0	19.4
Ethane	0.42	0.23	0.4	0.20	0.5	0.36
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.9	0.50	0.96	0.49	0.56	0.40
Nitrogen	1.0	0.55	1.02	0.52	0.72	0.52
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	44.71	0	49.38	0	27.91
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.001649		0.001661		0.001435	
CO_2 Produced, lb-mol/hr	0.001682		0.001657		0.001438	
H_2 Produced, lb-mol/hr	0.001674		0.001663		0.001433	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	1.06		1.06		0.92	

* Feed also contains 31.4 ppm of carbonyl sulfide.

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Table B-1, Part 4. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	10		11		12	
Feed Water Rate, lb-mol/hr	0.009594		0.009637		0.008601	
Feed Gas Rate, SCF/hr	3.5882		3.6062		3.5961	
Feed Benzene Rate, lb-mol/hr	0		0		0	
Feed H_2O/Gas Ratio (mol)	1.03		1.03		0.92	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	22.6	11.1	20.4	10.0	20.9	10.8
Carbon Dioxide	23.5	11.6	21.4	10.5	20.3	10.6
Hydrogen	20.77	10.2	27.97	13.8	29.97	15.6
Methane	31.0	15.3	27.7	13.6	26.1	13.6
Ethane	0.6	0.30	0.6	0.29	0.5	0.26
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.7	0.34	1.1	0.54	1.4	0.73
Nitrogen	0.08	0.39	0.8	0.39	0.8	0.41
Helium	0.03	0.01	0.03	0.01	0.03	
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	50.76	0	50.87	0	47.98
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	660		665		660	
Reactor Pressure, psig	500		200	100	1000	
Product Water Rate, lb-mol/hr	0.008443		0.00866		0.00755	
Product Gas Rate, SCF/hr	4.2039		3.9856		4.2171	
Product Benzene Rate, lb-mol/hr	0		0		0	
Product Gas Composition, mol %						
Carbon Monoxide	4.6	2.6	8.9	4.8	3.0	1.8
Carbon Dioxide	34.6	19.5	28.8	15.7	32.2	19.2
Hydrogen	32.4	18.2	34.9	19.0	40.28	23.8
Methane	26.6	15.0	25.1	13.6	22.3	13.2
Ethane	0.51	0.29	0.58	0.31	0.43	0.25
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.55	0.31	0.97	0.53	1.1	0.65
Nitrogen	0.71	0.40	0.72	0.39	0.67	0.39
Helium	0.03	0.02	0.03	0.02	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	43.68	0	45.67	0	40.70
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.00160		0.000990		0.001623	
CO_2 Produced, lb-mol/hr	0.00159		0.000977		0.001631	
H_2 Produced, lb-mol/hr	0.00159		0.000992		0.001613	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	1.03		0.63		1.04	

* Feed also contains 31.4 ppm of carbonyl sulfide.

B75071769d

Table B-1, Part 5. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	13		14		15	
Feed Water Rate, lb-mol/hr	0.005355		0.009590		0.01175	
Feed Gas Rate, SCF/hr	3.6960		3.4853		3.5566	
Feed Benzene Rate, lb-mol/hr	0.0009468		0.0009873		0.0009985	
Feed H_2O/Gas Ratio (mol)	0.51		0.96		1.14	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.8	13.2	19.2	9.8	22.1	10.3
Carbon Dioxide	20.4	13.5	20.2	10.3	17.5	8.2
Hydrogen	22.3	14.8	22.92	11.7	19.5	9.1
Methane	26.2	17.4	25.5	13.0	28.4	13.2
Ethane	0.45	0.30	0.45	0.23	0.43	0.20
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.1	0.72	1.09	0.56	1.08	0.50
Nitrogen	0.73	0.48	0.72	0.37	1.17	0.55
Helium	0.02	0.02	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	9.0	6.0	9.9	5.0	9.8	4.5
Water	0	33.58	0	49.03	0	53.44
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	660		660		665	
Reactor Pressure, psig	1000		1000		995	
Product Water Rate, lb-mol/hr	0.004448		0.008448		00.01014	
Product Gas Rate, SCF/hr	4.2795		4.1077		4.2954	
Product Benzene Rate, lb-mol/hr	0.000822		0.0009203		0.000886	
Product Gas Composition, mol %						
Carbon Monoxide	4.5	3.3	3.0	1.8	3.4	1.9
Carbon Dioxide	30.9	22.5	31.0	17.9	30.3	16.4
Hydrogen	32.6	23.8	33.58	19.4	31.68	17.1
Methane	22.9	16.7	22.1	12.8	24.2	13.1
Ethane	0.36	0.26	0.37	0.21	0.37	0.20
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.71	0.52	0.77	0.44	0.82	0.45
Nitrogen	0.63	0.46	0.66	0.38	1.01	0.55
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	7.38	5.4	8.5	4.9	8.2	4.33
Water	0	27.05	0	42.16	0	45.96
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.001548		0.001575		0.001859	
CO_2 Produced, lb-mol/hr	0.001553		0.001567		0.001960	
H_2 Produced, lb-mol/hr	0.001558		0.001578		0.001812	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.99		1.01		1.19	

* Feed also contains 31.4 ppm of carbonyl sulfide.

B75071769e

Table B-1, Part 6. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	16		17		18	
Feed Water Rate, lb-mol/hr	0.009884		0.005629		0.004497	
Feed Gas Rate, SCF/hr	3.7527		3.7526		1.8497	
Feed Benzene Rate, lb-mol/hr	0.001021		0.0009093		0.001017	
Feed H_2O/Gas Ratio (mol)	0.92		0.53		0.77	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	23.5	12.2	23.8	15.5	18.7	10.6
Carbon Dioxide	24.6	12.8	24.9	16.3	20.2	11.4
Hydrogen	9.1	4.8	9.2	6.0	15.6	8.8
Methane	30.7	15.9	31.0	20.3	25.2	14.2
Ethane	0.46	0.24	0.46	0.30	0.41	0.23
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.88	0.46	0.89	0.58	1.30	0.74
Nitrogen	1.23	0.64	1.24	0.81	1.07	0.60
Helium	0.03	0.01	0.03	0.02	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	9.5	4.9	8.48	5.58	17.50	9.86
Water	0	48.05	0	34.61	0	43.56
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	663		663		665	
Reactor Pressure, psig	503		502		502	
Product Water Rate, lb-mol/hr	0.008039		0.004405		0.003579	
Product Gas Rate, SCF/hr	4.3373		4.3446		2.2119	
Product Benzene Rate, lb-mol/hr	0.0009036		0.0008811		0.0009055	
Product Gas Composition, mol %						
Carbon Monoxide	7.8	4.7	7.9	5.82	2.0	1.3
Carbon Dioxide	34.7	20.9	34.5	25.3	32.1	20.8
Hydrogen	21.0	12.7	21.0	15.4	28.0	18.2
Methane	26.9	16.2	27.1	19.9	22.0	15.0
Ethane	0.40	0.24	0.41	0.30	0.36	0.23
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.58	0.35	0.67	0.49	0.95	0.62
Nitrogen	1.08	0.65	1.08	0.79	0.95	0.62
Helium	0.02	0.01	0.02	0.02	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	7.52	4.47	7.32	5.3	13.62	8.8
Water	0	39.78	0	26.68	0	34.42
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.001580		0.001566		0.000956	
CO_2 Produced, lb-mol/hr	0.001576		0.001549		0.000958	
H_2 Produced, lb-mol/hr	0.001577		0.001567		0.000954	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	1.01		1.00		0.61	

* Feed also contains 31.4 ppm of carbonyl sulfide.

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Table B-1, Part 7. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	19		20	
Feed Water Rate, lb-mol/hr	0.002492		0.002806	
Feed Gas Rate, SCF/hr	1.8348		1.8654	
Feed Benzene Rate, lb-mol/hr	0.001040		0.000732	
Feed H_2O/Gas Ratio (mol)	0.43		0.50	
Basis for Analysis	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*				
Carbon Monoxide	19.4	13.5	21.7	14.4
Carbon Dioxide	20.4	14.2	22.6	15.0
Hydrogen	14.0	9.8	12.3	8.2
Methane	25.4	17.8	27.4	18.2
Ethane	0.41	0.29	0.43	0.28
Propane	0	0	0	0
Butanes	0	0	0	0
Hydrogen Sulfide	1.34	0.94	1.04	0.69
Nitrogen	1.10	0.77	1.30	0.87
Helium	0.02	0.02	0.03	0.02
Ammonia	0	0	0	0
Phenol	0	0	0	0
Benzene	17.93	12.5	13.2	8.7
Water	0	30.18	0	33.64
Total	100.00	100.00	100.00	100.00
Reactor Temperature, °F	665		652	
Reactor Pressure, psig	510		250	
Product Water Rate, lb-mol/hr	0.001769		0.001979	
Product Gas Rate, SCF/hr	2.1892		2.1572	
Product Benzene Rate, lb-mol/hr	0.000979		0.000324	
Product Gas Composition, mol %				
Carbon Monoxide	2.8	2.2	7.6	5.7
Carbon Dioxide	31.6	24.9	34.1	25.6
Hydrogen	26.2	20.8	24.4	18.3
Methane	22.6	17.8	26.1	19.6
Ethane	0.30	0.24	0.40	0.30
Propane	0	0	0	0
Butanes	0	0	0	0
Hydrogen Sulfide	0.93	0.73	0.59	0.44
Nitrogen	0.93	0.73	1.23	0.92
Helium	0.02	0.02	0.02	0.02
Ammonia	0	0	0	0
Phenol	0	0	0	0
Benzene	14.62	11.6	5.56	0.1
Water	0	20.98	0	25.02
Total	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000936		0.000761	
CO_2 Produced, lb-mol/hr	0.000922		0.000764	
H_2 Produced, lb-mol/hr	0.000937		0.000760	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.60		0.49	

* Feed also contains 31.4 ppm of carbonyl sulfide.

B75071769g

Table B-1, Part 8. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	21		22		23	
Feed Water Rate, lb-mol/hr	0.005605		0.009708		0.005445	
Feed Gas Rate, SCF/hr	1.8997		3.5429		3.5680	
Feed Benzene Rate, lb-mol/hr	0.000798		0.000944		0.000954	
Feed H_2O/Gas Ratio (mol)	0.98		0.96		0.53	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.3	10.3	21.4	10.9	23.8	15.6
Carbon Dioxide	20.7	10.4	23.2	11.9	25.1	16.4
Hydrogen	15.4	7.8	14.5	7.4	14.9	9.7
Methane	26.7	13.5	28.8	14.7	23.9	15.6
Ethane	0.43	0.22	0.45	0.23	0.45	0.29
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.29	0.65	1.12	0.57	1.13	0.73
Nitrogen	1.29	0.65	1.19	0.61	1.28	0.84
Helium	0.03	0.01	0.03	0.01	0.03	0.02
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	13.86	7.04	9.31	4.8	9.41	6.1
Water	0	49.43	0	48.88	0	34.72
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	664		665		664	
Reactor Pressure, psig	255		250		255	
Product Water Rate, lb-mol/hr	0.004556		0.007873		0.004117	
Product Gas Rate, SCF/hr	2.2590		4.0997		4.1011	
Product Benzene Rate, lb-mol/hr	0.000673		0.000922		0.000952	
Product Gas Composition, mol %						
Carbon Monoxide	4.1	2.4	6.9	4.1	9.1	6.7
Carbon Dioxide	31.9	18.8	32.4	19.3	33.4	24.9
Hydrogen	27.3	16.1	24.8	14.7	24.9	18.5
Methane	23.9	14.0	25.4	15.1	21.0	15.7
Ethane	0.35	0.21	0.37	0.22	0.37	0.27
Propane	0	0	0	0	0	0
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	0.98	0.58	0.99	0.59	0.96	0.71
Nitrogen	1.15	0.68	1.05	0.62	1.07	0.83
Helium	0.02	0.01	0.03	0.02	0.02	0.02
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	10.3	5.9	8.06	4.8	9.18	6.1
Water	0	41.32	0	40.55	0	26.27
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000898		0.001377		0.001381	
CO_2 Produced, lb-mol/hr	0.000896		0.001383		0.001345	
H_2 Produced, lb-mol/hr	0.000899		0.001374		0.001385	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.58		0.88		0.88	

* Feed also contains 31.4 ppm of carbonyl sulfide and 235.6 ppm methyl mercaptan.

B75092246a

Table B-1, Part 9. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	24		25		26	
Feed Water Rate, lb-mol/hr	0.008027		0.00600		0.006208	
Feed Gas Rate, SCF/hr	1.8772		1.8700		3.5020	
Feed Benzene Rate, lb-mol/hr	0.000768		0.000761		0.0009536	
Feed H_2O/Gas Ratio (mol)	1.42		1.06		0.62	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.4	8.04	19.5	9.4	23.9	14.8
Carbon Dioxide	22.2	9.2	22.2	10.7	19.7	12.2
Hydrogen	17.3	7.2	17.4	8.4	18.5	11.4
Methane	22.1	9.2	22.7	11.0	22.4	13.8
Ethane	0.95	0.40	0.69	0.33	0.73	0.45
Propane	0.52	0.21	0.51	0.25	0.45	0.28
Butanes	0.09	0.04	0.09	0.04	0.09	0.06
Hydrogen Sulfide	1.9	0.78	1.9	0.93	2.67	1.65
Nitrogen	1.5	0.61	1.0	0.50	1.83	1.13
Helium	0.03	0.01	0.03	0.01	0.03	0.02
Ammonia	0.51	0.21	0.38	0.18	0.22	0.14
Phenol	0	0	0	0	0	0
Benzene	13.5	5.6	13.6	6.5	9.48	5.86
Water	0	58.5	0	51.76	0	38.21
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	665		665		665	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.007068		0.004924		0.004766	
Product Gas Rate, SCF/hr	2.2490		2.2370		4.1164	
Product Benzene Rate, lb-mol/hr	0.000657		0.000735		.000925	
Product Gas Composition, mol %						
Carbon Monoxide	2.4	1.2	1.8	1.0	4.2	2.97
Carbon Dioxide	33.9	16.2	33.7	19.2	33.8	23.9
Hydrogen	29.3	14.0	29.9	17.0	28.6	20.2
Methane	19.6	9.4	19.6	11.2	21.1	14.9
Ethane	0.77	0.37	0.54	0.30	0.56	0.40
Propane	0.46	0.22	0.44	0.25	0.37	0.26
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.39	0.68	1.6	0.91	1.7	1.19
Nitrogen	1.29	0.61	0.89	0.51	1.6	1.13
Helium	0.02	0.01	0.02	0.01	0.02	0.02
Ammonia	0.25	0.12	0.33	0.19	0.19	0.14
Phenol	0	0	0	0	0	0
Benzene	10.62	4.9	11.18	6.4	7.86	5.7
Water	0	52.29	0	43.03	0	29.19
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000938		0.000982		0.001924	
CO_2 Produced, lb-mol/hr	0.000935		0.000943		0.001922	
H_2 Produced, lb-mol/hr	0.000912		0.000960		0.001437	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.60		0.63		1.23	

* Feed also contains 31.4 ppm of carbonyl sulfide and 235.6 ppm methyl mercaptan.

B750922466

Table B-1, Part 10. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	27		28		29	
Feed Water Rate, lb-mol/hr	0.009887		0.00930		0.00653	
Feed Gas Rate, SCF/hr	3.5004		2.2468		2.2394	
Feed Benzene Rate, lb-mol/hr	0.001014		0.000689		0.000667	
Feed H_2O/Gas Ratio (mol)	0.98		1.42		1.00	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.6	10.4	18.7	7.7	18.3	9.1
Carbon Dioxide	23.6	11.9	21.3	8.8	19.9	9.9
Hydrogen	16.1	8.2	23.0	9.5	25.6	12.8
Methane	23.1	11.7	21.1	8.7	20.6	10.3
Ethane	1.6	0.82	1.6	0.66	1.6	0.81
Propane	0.44	0.22	0.44	0.18	0.45	0.22
Butanes	0.09	0.05	0.09	0.04	0.09	0.04
Hydrogen Sulfide	2.3	1.2	1.5	0.62	1.5	0.76
Nitrogen	1.7	0.86	1.6	0.66	1.2	0.58
Helium	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.35	0.18	0	0	0.36	0.18
Phenol	0	0	0	0	0	0
Benzene	10.09	5.1	10.64	4.4	10.37	5.1
Water	0	49.36	0	58.73	0	50.2
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	665		668		665	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.008600		0.00822		0.00518	
Product Gas Rate, SCF/hr	4.1038		2.6242		2.5755	
Product Benzene Rate, lb-mol/hr	0.001011		0.000627		0.000602	
Product Gas Composition, mol %						
Carbon Monoxide	4.2	2.4	3.4	1.6	3.5	2.0
Carbon Dioxide	34.3	19.7	32.4	15.0	30.6	17.9
Hydrogen	27.5	15.8	33.6	15.8	35.0	20.5
Methane	20.2	11.6	18.8	8.8	18.4	10.7
Ethane	1.1	0.65	1.3	0.64	1.1	0.65
Propane	0.38	0.20	0.37	0.17	0.37	0.21
Butanes	0	0	0.07	0.03	0.06	0.04
Hydrogen Sulfide	1.8	1.03	1.1	0.51	1.1	0.65
Nitrogen	1.5	0.84	1.4	0.67	1.0	0.61
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.17	0.10	0	0	0.16	0.10
Phenol	0	0	0	0	0	0
Benzene	8.83	5.0	7.54	4.2	8.69	5.1
Water	0	42.67	0	52.57	0	41.53
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.001605		0.000968		0.000942	
CO_2 Produced, lb-mol/hr	0.001593		0.000961		0.000938	
H_2 Produced, lb-mol/hr	0.001562		0.000971		0.000891	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	1.03		0.97		0.94	

* Feed also contains 31.4 ppm of carbonyl sulfide and 235.6 ppm methyl mercaptan.

B75092246c

Table B-1, Part 11. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	30		31		32	
Feed Water Rate, lb-mol/hr	0.00644		0.00628		0.00382	
Feed Gas Rate, SCF/hr	2.2389		2.2403		2.2348	
Feed Benzene Rate, lb-mol/hr	0.000719		0.000634		0.000635	
Feed H_2O/Gas Ratio (mol)	0.98		0.97		0.59	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.4	8.8	18.4	9.3	18.6	11.7
Carbon Dioxide	20.2	10.2	22.3	11.3	20.8	13.1
Hydrogen	25.6	12.9	22.8	11.5	23.5	14.7
Methane	20.4	10.3	21.7	11.0	22.0	13.9
Ethane	1.3	0.67	1.6	0.82	1.4	0.90
Propane	0.88	0.45	0.54	0.27	0.45	0.28
Butanes	0.09	0.05	0.09	0.05	0.09	0.06
Hydrogen Sulfide	1.4	0.71	1.1	0.55	1.07	0.67
Nitrogen	1.2	0.58	1.2	0.64	1.24	0.78
Helium	0.03	0.01	0.03	0.01	0.03	0.02
Ammonia	0.35	0.18	0.35	0.18	0.86	0.54
Phenol	0.08	0.04	0.07	0.04	0.07	0.05
Benzene	11.07	5.5	9.82	4.9	9.89	6.15
Water	0	49.61	0	49.44	0	37.15
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	664		668		669	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.00511		0.00500		0.00251	
Product Gas Rate, SCF/hr	2.5024		2.5539		2.5925	
Product Benzene Rate, lb-mol/hr	0.000644		0.000570		0.000508	
Product Gas Composition, mol %						
Carbon Monoxide	3.7	2.2	4.3	2.5	4.9	3.6
Carbon Dioxide	30.7	17.9	31.7	19.0	30.5	22.6
Hydrogen	32.9	19.2	31.5	18.8	32.8	24.4
Methane	19.5	11.4	19.7	11.8	20.6	15.2
Ethane	0.75	0.44	1.1	0.66	1.2	0.89
Propane	0.84	0.49	0.37	0.22	0.28	0.20
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.1	0.66	0.93	0.56	1.0	0.76
Nitrogen	1.0	0.60	1.1	0.66	1.1	0.82
Helium	0.03	0.02	0.03	0.02	0.03	0.02
Ammonia	0.17	0.10	0.14	0.09	0.13	0.09
Phenol	0.07	0.04	0.07	0.04	0.07	0.05
Benzene	9.24	5.2	9.06	4.7	7.39	5.5
Water	0	41.75	0	40.95	0	25.87
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000875		0.000887		0.000860	
CO_2 Produced, lb-mol/hr	0.000871		0.000879		0.000854	
H_2 Produced, lb-mol/hr	0.000678		0.000822		0.000858	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.88		0.89		0.86	

* Feed also contains 31.4 ppm of carbonyl sulfide and 235.6 ppm methyl mercaptan.

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Table B-1, Part 12. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	33		34		35	
Feed Water Rate, lb-mol/hr	0.00422		0.00773		0.00532	
Feed Gas Rate, SCF/hr	2.2422		2.2349		2.2414	
Feed Benzene Rate, lb-mol/hr	0.00122		0.000858		0	
Feed H_2O/Gas Ratio (mol)	0.59		1.16		0.91	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	16.2	10.2	17.1	7.9	20.5	10.7
Carbon Dioxide	17.9	11.2	18.9	8.8	23.2	12.1
Hydrogen	25.2	15.8	26.7	12.4	28.37	14.8
Methane	18.6	11.7	19.6	9.1	24.2	12.6
Ethane	1.3	0.82	1.3	0.60	1.5	0.78
Propane	0.41	0.26	0.43	0.20	0.5	0.26
Butanes	0.08	0.05	0.09	0.04	0.1	0.05
Hydrogen Sulfide	1.3	0.82	1.4	0.64	0.8	0.42
Nitrogen	1.1	0.72	1.2	0.56	0.8	0.42
Helium	0.02	0.01	0.02	0.01	0.03	0.01
Ammonia	0.22	0.14	0.42	0.20	0	0
Phenol	0.13	0.08	0.10	0.05	0	0
Benzene	17.54	10.8	12.74	5.9	0	0
Water	0	37.4	0	53.60	0	47.86
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	669		669		564	
Reactor Pressure, psig	1000		1000		500	
Product Water Rate, lb-mol/hr	0.00298		0.00629		0.00423	
Product Gas Rate, SCF/hr	2.5820		2.5938		2.5626	
Product Benzene Rate, lb-mol/hr	0.00107		0.000678		0	
Product Gas Composition, mol %						
Carbon Monoxide	3.7	2.7	2.9	1.6	5.1	3.1
Carbon Dioxide	27.3	19.8	29.3	15.9	33.1	20.2
Hydrogen	33.5	24.1	36.4	19.7	37.6	22.9
Methane	17.6	12.7	17.7	9.5	21.02	12.9
Ethane	1.1	0.81	1.2	0.68	1.3	0.80
Propane	0.36	0.26	0.40	0.22	0.44	0.27
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.1	0.81	1.27	0.68	0.71	0.43
Nitrogen	1.0	0.74	1.10	0.59	0.71	0.43
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.14	0.10	0.31	0.17	0	0
Phenol	0.12	0.09	0.09	0.05	0	0
Benzene	14.06	10.2	9.31	5.2	0	0
Water	0	27.68	0	45.70	0	38.96
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000856		0.000923		0.000856	
CO_2 Produced, lb-mol/hr	0.000862		0.000918		0.000848	
H_2 Produced, lb-mol/hr	0.000809		0.000920		0.000841	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.86		0.92		0.85	

* Feed also contains 31.4 ppm of carbonyl sulfide and 235.6 ppm methyl mercaptan.

B75092246e

Table B-1, Part 13. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	36		37		38	
Feed Water Rate, lb-mol/hr	0.00742		0.00383		0.00367	
Feed Gas Rate, SCF/hr	2.2418		2.2493		2.2545	
Feed Benzene Rate, lb-mol/hr	0		0.000770		0.000775	
Feed H_2O Gas Ratio (mol)	1.27		0.58		0.55	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	22.3	9.8	20.8	13.2	19.9	12.8
Carbon Dioxide	23.8	10.5	22.8	14.4	21.0	13.5
Hydrogen	23.47	10.3	19.9	12.6	23.3	15.0
Methane	24.2	10.6	19.8	12.5	19.0	12.2
Ethane	1.6	0.70	1.2	0.78	1.4	0.91
Propane	0.5	0.22	0.35	0.22	0.44	0.28
Butanes	0.1	0.04	0.09	0.06	0.09	0.06
Hydrogen Sulfide	3.2	1.4	2.3	1.45	2.4	1.5
Nitrogen	0.8	0.36	0.97	0.61	0.8	0.51
Helium	0.03	0.01	0.02	0.02	0.02	0.02
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	11.77	7.4	11.65	7.5
Water	0	56.07	0	36.76	0	35.72
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	638		652		668	
Reactor Pressure, psig	503		500		500	
Product Water Rate, lb-mol/hr	0.00614		0.00258		0.00245	
Product Gas Rate, SCF/hr	2.6139		2.5773		2.5899	
Product Benzene Rate, lb-mol/hr	0		0.000344		0.000529	
Product Gas Composition, mol %						
Carbon Monoxide	4.8	2.5	7.8	5.8	6.4	4.8
Carbon Dioxide	34.8	18.2	33.1	24.2	31.0	23.2
Hydrogen	34.65	18.1	30.4	22.3	33.1	24.7
Methane	20.8	10.9	18.8	13.7	17.8	13.3
Ethane	1.4	0.72	1.2	0.85	1.2	0.91
Propane	0.43	0.22	0.32	0.24	0.37	0.28
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.4	1.3	2.0	1.5	1.7	1.2
Nitrogen	0.69	0.36	0.90	0.66	0.73	0.55
Helium	0.03	0.01	0.02	0.02	0.02	0.02
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	5.46	3.9	7.68	5.8
Water	0	47.69	0	26.83	0	25.24
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000975		0.000820		0.000851	
CO_2 Produced, lb-mol/hr	0.000968		0.000821		0.000857	
H_2 Produced, lb-mol/hr	0.000974		0.000826		0.000852	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.97		0.82		0.85	

* Feed also contains 31.4 ppm of carbonyl sulfide and 235.6 ppm methyl mercaptan.

B750922461

Table B-1, Part 14. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	39	
Feed Water Rate, lb-mol/hr	0.00743	
Feed Gas Rate, SCF/hr	2.2609	
Feed Benzene Rate, lb-mol/hr	0.000762	
Feed H_2O/Gas Ratio (mol)	1.12	
Basis for Analysis	Dry	Wet
Feed Gas Composition, mol %*		
Carbon Monoxide	25.3	11.9
Carbon Dioxide	21.1	9.9
Hydrogen	15.2	7.2
Methane	22.6	10.6
Ethane	1.5	0.70
Propane	0.44	0.21
Butanes	0.87	0.41
Hydrogen Sulfide	1.1	0.54
Nitrogen	1.1	0.50
Helium	0.02	0.01
Ammonia	0	0
Phenol	0	0
Benzene	10.77	5.4
Water	0	52.63
Total	100.00	100.00
Reactor Temperature, °F	656	
Reactor Pressure, psig	200	
Product Water Rate, lb-mol/hr	0.00633	
Product Gas Rate, SCF/hr	2.5749	
Product Benzene Rate, lb-mol/hr	0.000704	
Product Gas Composition, mol %		
Carbon Monoxide	11.4	6.1
Carbon Dioxide	30.3	16.3
Hydrogen	24.4	13.1
Methane	20.5	11.0
Ethane	1.4	0.74
Propane	0.36	0.20
Butanes	0.08	0.04
Hydrogen Sulfide	0.74	0.39
Nitrogen	0.95	0.51
Helium	0.02	0.01
Ammonia	0	0
Phenol	0	0
Benzene	9.85	5.4
Water	0	46.21
Total	100.00	100.00
CO Converted, lb-mol/hr	0.000842	
CO_2 Produced, lb-mol/hr	0.000833	
H_2 Produced, lb-mol/hr	0.000789	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.84	

* Feed also contains 31.4 ppm of carbonyl sulfide and 235.6 ppm methyl mercaptan.

R75092246g

Table B-1, Part 15. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	40		41		42	
Feed Water Rate, lb-mol/hr	0.004919		0.004929		0.003700	
Feed Gas Rate, SCF/hr	1.2968		1.3224		1.3059	
Feed Benzene Rate, lb-mol/hr	0.000446		0.0004538		0.0004269	
Feed H_2O/Gas Ratio (mol)	1.29		1.27		0.97	
Feed Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	22.5	9.8	18.5	8.1	18.5	9.4
Carbon Dioxide	18.9	8.2	15.9	7.0	16.1	8.2
Hydrogen	23.1	10.1	30.5	13.5	30.7	15.6
Methane	19.3	8.4	17.8	7.9	17.9	9.1
Ethane	1.2	0.54	1.3	0.58	1.3	0.68
Propane	0.34	0.15	0.44	0.19	0.44	0.23
Butanes	0.08	0.03	0.08	0.03	0.08	0.04
Hydrogen Sulfide	1.9	0.82	2.4	1.1	2.4	1.2
Nitrogen	0.86	0.38	1.2	0.54	1.2	0.63
Helium	0.03	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	11.79	5.1	11.86	5.1	11.36	5.7
Water	0	56.47	0	55.95	0	49.21
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	656		656		656	
Reactor Pressure, psig	250		500		500	
Product Water Rate, lb-mol/hr	0.003622		0.3697		0.002467	
Product Gas Rate, SCF/hr	1.5358		1.5442		1.5328	
Product Benzene Rate, lb-mol/hr	0.000407		0.000405		0.000386	
Product Gas Composition, mol %						
Carbon Monoxide	5.4	3.0	2.9	1.5	2.9	1.8
Carbon Dioxide	30.5	16.7	27.4	14.9	27.5	17.6
Hydrogen	34.1	18.7	40.3	21.9	40.1	25.6
Methane	16.8	9.2	15.6	8.5	15.7	10.0
Ethane	1.1	0.59	1.1	0.63	1.2	0.75
Propane	0.27	0.15	0.36	0.19	0.37	0.23
Butanes	0.07	0.04	0.07	0.04	0.07	0.05
Hydrogen Sulfide	1.4	0.77	1.6	0.88	2.0	1.3
Nitrogen	0.75	0.41	1.1	0.59	1.1	0.69
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	9.59	5.2	9.55	5.1	9.04	5.8
Water	0	45.23	0	45.76	0	36.17
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000618		0.000596		0.000581	
CO_2 Produced, lb-mol/hr	0.000618		0.000588		0.000586	
H_2 Produced, lb-mol/hr	0.000619		0.000589		0.000579	
Rate of CO Conversion, x 10^4 lb-mol/hr-g catalyst	0.62		0.60		0.58	

[1]Feed also contains 31.4 ppm carbonyl sulfide and 235.6 ppm methyl mercaptan.

B75092246h

Table B-1, Part 16. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	43		44		45	
Feed Water Rate, lb-mol/hr	0.007388		0.003759		0.007302	
Feed Gas Rate, SCF/hr	2.2483		2.2562		6	
Feed Benzene Rate, lb-mol/hr	0.0004395		0		0	
Feed H_2O/Gas Ratio (mol)	1.18		0.64		1.24	
Feed Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	18.6	8.5	19.2	11.7	21.8	9.7
Carbon Dioxide	15.6	7.2	16.8	10.2	16.8	7.5
Hydrogen	36.7	16.8	40.18	24.4	36.28	16.2
Methane	17.7	8.1	18.6	11.3	19.5	8.7
Ethane	1.2	0.56	1.4	0.85	1.5	0.67
Propane	0.37	0.17	0.4	0.24	0.4	0.17
Butanes	0.09	0.04	0.1	0.06	0.1	0.04
Hydrogen Sulfide	1.8	0.85	2.4	1.5	2.4	1.1
Nitrogen	0.84	0.39	0.9	0.55	1.2	0.54
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	7.08	3.2	0	0	0	0
Water	0	54.18	0	39.19	0	55.37
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	659		664		539	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.006206		0.002584		0.006135	
Product Gas Rate, SCF/hr	2.5196		2.5813		2.6664	
Product Benzene Rate, lb-mol/hr	0.000392		0		0	
Product Gas Composition, mol %						
Carbon Monoxide	2.9	1.5	3.0	2.2	3.2	1.3
Carbon Dioxide	27.4	14.5	28.3	20.5	30.3	16.1
Hydrogen	43.3	22.8	47.82	34.4	45.65	24.5
Methane	17.0	9.0	17.3	12.5	16.9	9.0
Ethane	0.97	0.51	0.89	0.65	0.97	0.51
Propane	0.19	0.10	0.19	0.14	0.29	0.15
Butanes	0	0	0.09	0.06	0.07	0.04
Hydrogen Sulfide	1.5	0.81	1.6	1.2	1.6	0.83
Nitrogen	0.76	0.40	0.79	0.57	1.0	0.54
Helium	0.01	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	5.97	3.1	0	0	0	0
Water	0	47.27	0	27.77	0	47.02
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.0009699		0.000921		0.001111	
CO_2 Produced, lb-mol/hr	0.000924		0.000919		0.001115	
H_2 Produced, lb-mol/hr	0.000692		0.000844		0.001068	
Rate of CO Conversion, x 10^4 lb-mol/hr-g catalyst	0.97		0.92		1.11	

[1]Feed also contains 31.4 ppm carbonyl sulfide and 235.6 ppm methyl mercaptan.

B75092246i

Table B-1, Part 17. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	46		47		48	
Feed Water Rate, lb-mol/hr	0.008174		0.008299		0.005996	
Feed Gas Rate, SCF/hr	1.9966		1.9916		2.0079	
Feed Benzene Rate, lb-mol/hr	0.001305		0.001345		0.001562	
Feed H_2O/Gas Ratio (mol)	1.26		1.27		0.89	
Feed Gas Composition, mol%	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	16.7	7.4	15.2	6.7	16.1	8.5
Carbon Dioxide	13.7	6.1	13.6	6.0	13.8	7.3
Hydrogen	29.9	13.2	30.9	13.6	28.5	15.1
Methane	15.2	6.7	15.1	6.6	14.6	7.8
Ethane	1.0	0.45	1.0	0.45	0.84	0.45
Propane	0.32	0.14	0.4	0.18	0.38	0.20
Butanes	0.08	0.04	0.08	0.03	0.08	0.04
Hydrogen Sulfide	2.2	0.99	2.2	0.98	2.0	1.1
Nitrogen	0.72	0.32	0.72	0.32	0.62	0.33
Helium	0.02	0.01	0.02	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	20.16	8.9	20.78	9.1	23.07	12.2
Water	0	55.75	0	56.03	0	46.97
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	540		540		550	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.007171		0.007186		0.004691	
Product Gas Rate, SCF/hr	2.2719		2.2761		2.3416	
Product Benzene Rate, lb-mol/hr	0.001039		0.001129		0.00038	
Product Gas Composition, mol %						
Carbon Monoxide	5.3	2.6	3.1	1.5	3.6	2.1
Carbon Dioxide	23.1	11.4	23.7	11.7	27.9	16.1
Hydrogen	38.2	18.8	39.8	19.7	43.0	24.9
Methane	14.3	7.0	14.2	7.0	15.5	8.9
Ethane	0.95	0.47	0.95	0.47	0.84	0.48
Propane	0.26	0.13	0.27	0.13	0.37	0.22
Butanes	0.07	0.04	0.07	0.04	0.08	0.04
Hydrogen Sulfide	1.6	0.77	1.7	0.87	1.7	0.97
Nitrogen	0.68	0.33	0.67	0.33	0.65	0.38
Helium	0.01	0.01	0.01	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	15.53	7.6	15.53	8.2	6.34	3.7
Water	0	50.85	0	50.05	0	42.20
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000716		0.000779		0.000855	
CO_2 Produced, lb-mol/hr	0.000716		0.000775		0.000857	
H_2 Produced, lb-mol/hr	0.000715		0.000787		0.000848	
Rate of CO Conversion, x 10^4 lb-mol/hr-g catalyst	0.72		0.78		0.86	

[1]Feed also contains 31.4 ppm carbonyl sulfide and 235.6 ppm methyl mercaptan.

B75092246j

Table B-1, Part 18. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 15.6 g)

Run No.	49		50		51	
Feed Water Rate, lb-mol/hr	0.003399		0.004772		0.007239	
Feed Gas Rate, SCF/hr	1.3215		2.2129		2.2129	
Feed Benzene Rate, lb-mol/hr	0		0		0	
Feed H_2O/Gas Ratio (mol)	0.99		0.83		1.26	
Feed Gas Composition, mol%	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	23.1	11.6	23.5	12.8	23.5	10.4
Carbon Dioxide	18.9	9.5	18.4	10.0	18.4	8.1
Hydrogen	33.58	16.9	33.58	18.3	33.58	14.8
Methane	19.9	10.0	20.3	11.0	20.3	9.0
Ethane	1.2	0.60	1.2	0.65	1.2	0.53
Propane	0.5	0.25	0.5	0.27	0.5	0.22
Butanes	0.1	0.05	0.1	0.05	0.1	0.04
Hydrogen Sulfide	2.0	1.0	1.6	0.87	1.6	0.71
Nitrogen	0.7	0.35	0.8	0.44	0.8	0.35
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	49.74	0	45.61	0	55.84
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	662		661		661	
Reactor Pressure, psig	500		250		250	
Product Water Rate, lb-mol/hr	0.002284		0.004098		0.004098	
Product Gas Rate, SCF/hr	1.5183		2.4624		2.4624	
Product Benzene Rate, lb-mol/hr	0		0		0	
Product Gas Composition, mol %						
Carbon Monoxide	5.5	3.5	10.1	6.2	10.1	6.2
Carbon Dioxide	30.9	19.6	28.9	17.6	28.9	17.6
Hydrogen	42.02	26.5	39.22	23.8	39.22	23.8
Methane	19.0	12.0	18.3	11.1	18.3	11.1
Ethane	0.58	0.37	1.0	0.61	1.0	0.61
Propane	0.20	0.13	0.45	0.27	0.45	0.27
Butanes	0	0	0.09	0.05	0.09	0.05
Hydrogen Sulfide	1.2	0.75	1.2	0.74	1.2	0.74
Nitrogen	0.58	0.37	0.72	0.44	0.72	0.44
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	36.77	0	39.18	0	39.18
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000575		0.000699		0.000699	
CO_2 Produced, lb-mol/hr	0.000572		0.000789		0.000789	
H_2 Produced, lb-mol/hr	0.000498		0.000568		0.000568	
Rate of CO Conversion, x 10^4 lb-mol/hr-g catalyst	0.58		0.70		0.70	

[1]Feed also contains 31.4 ppm carbonyl sulfide and 235.6 ppm methyl mercaptan.

B75092246k

Table B-2, Part 1. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	52		53		54	
Feed Water Rate, lb-mol/hr	0.00524		0.008102		0.008468	
Feed Gas Rate, SCF/hr	1.3269		1.9847		1.9917	
Feed Benzene Rate, lb-mol/hr	0		0.001285		0.001327	
Feed H_2O/Gas Ratio (mol)	1.52		1.26		1.30	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	24.4	9.7	16.0	7.1	16.6	7.2
Carbon Dioxide	19.6	7.8	13.5	6.0	13.3	5.8
Hydrogen	32.68	12.96	31.3	13.8	30.0	13.0
Methane	19.0	7.5	15.2	6.7	15.1	6.5
Ethane	1.3	0.51	1.2	0.53	0.55	0.24
Propane	0.5	0.19	0.5	0.21	0.40	0.17
Butanes	0.1	0.04	0.08	0.04	--	--
Hydrogen Sulfide	1.6	0.63	1.6	0.71	2.54	1.10
Nitrogen	0.8	0.32	0.71	0.32	0.95	0.41
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	19.89	8.8	20.47	8.9
Water	0	60.34	0	55.78	0	56.64
Carbonyl Sulfide	--	--	--	--	0.07	0.03
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	661		546		538	
Reactor Pressure, psig	250		1000		1000	
Product Water Rate, lb-mol/hr	0.00410		0.007039		0.007293	
Product Gas Rate, SCF/hr	1.5462		2.2465		2.2579	
Product Benzene Rate, lb-mol/hr	0		0.001268		0.001271	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	5.9	2.88	4.6	2.3	4.99	2.47
Carbon Dioxide	31.9	15.8	21.9	11.0	22.1	10.9
Hydrogen	42.35	20.9	38.1	19.1	37.4	18.5
Methane	16.4	8.1	13.8	6.9	13.8	6.8
Ethane	1.12	0.55	1.1	0.54	0.50	0.25
Propane	0.42	0.21	0.4	0.21	0.36	0.18
Butanes	0.08	0.04	0.04	0.02	--	--
Hydrogen Sulfide	1.14	0.57	1.3	0.66	1.64	0.81
Nitrogen	0.67	0.33	0.6	0.33	0.87	0.43
Helium	0.02	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	18.05	8.9	18.25	8.97
Water	0	50.61	0	50.03	0	50.64
Carbonyl Sulfide	--	--	--	--	0.08	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.0006068		0.000705		0.000725	
CO_2 Produced, lb-mol/hr	0.0006070		0.000689		0.000709	
H_2 Produced, lb-mol/hr	0.0005700		0.000696		0.000721	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.61		0.70		0.73	

*Feed gas also contains 31.4 ppm carbonyl sulfide and 235.6 ppm methyl mercaptan.

B76050959a

Table B-2, Part 2. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	55		56		57	
Feed Water Rate, lb-mol/hr	0.008321		0.008334		0.008340	
Feed Gas Rate, SCF/hr	1.9707		1.9916		1.9916	
Feed Benzene Rate, lb-mol/hr	0.001384		0.001303		0.001362	
Feed H_2O/Gas Ratio (mol)	1.28		1.29		1.28	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	17.1	7.5	17.4	7.6	14.7	6.5
Carbon Dioxide	14.2	6.2	13.7	6.0	14.2	6.3
Hydrogen	28.1	12.3	27.9	12.2	31.1	13.6
Methane	15.3	6.7	15.5	6.8	14.7	6.4
Ethane	0.55	0.24	0.40	0.17	0.63	0.27
Propane	0.40	0.17	0.40	0.17	0.15	0.07
Butanes	0.07	0.03	0.08	0.03	0.08	0.03
Hydrogen Sulfide	2.35	1.03	3.67	1.61	2.69	1.18
Nitrogen	0.48	0.21	0.57	0.25	0.70	0.31
Helium	0.02	0.01	0.01	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	21.36	9.3	20.29	8.8	20.95	9.1
Water	0	56.28	0	56.33	0	56.20
Carbonyl Sulfide	0.07	0.03	0.08	0.03	0.08	0.03
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	535		667		757	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.007024		0.007209		0.007136	
Product Gas Rate, SCF/hr	2.2190		2.3158		2.2449	
Product Benzene Rate, lb-mol/hr	0.001372		0.001256		0.001281	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	6.3	3.2	3.2	1.6	4.0	2.0
Carbon Dioxide	22.1	11.1	24.5	12.3	22.6	11.3
Hydrogen	34.7	17.5	37.0	18.6	38.1	19.0
Methane	13.9	7.0	13.7	6.9	13.5	6.7
Ethane	0.50	0.25	0.35	0.17	0.56	0.28
Propane	0.36	0.18	0.35	0.17	0.14	0.07
Butanes	0.07	0.03	0.06	0.03	0	0
Hydrogen Sulfide	1.96	0.99	2.82	1.42	2.21	1.11
Nitrogen	0.43	0.22	0.51	0.25	0.65	0.32
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	19.59	9.7	17.42	8.6	18.15	9.0
Water	0	49.78	0	49.91	0	50.17
Carbonyl Sulfide	0.08	0.04	0.08	0.04	0.08	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000662		0.000895		0.0006768	
CO_2 Produced, lb-mol/hr	0.000651		0.000892		0.0006789	
H_2 Produced, lb-mol/hr	0.000653		0.000885		0.0006755	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.66		0.89		0.68	

*Feed gas also contains 31.4 ppm carbonyl sulfide and 235.6 ppm methyl mercaptan.

B76050959b

Table B-2, Part 3. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	58		59		60	
Feed Water Rate, lb-mol/hr	0.008402		0.005487		0.005996	
Feed Gas Rate, SCF/hr	1.9847		2.2562		2.2551	
Feed Benzene Rate, lb-mol/hr	0.001349		0		0	
Feed H_2O/Gas Ratio (mol)	1.29		0.94		1.02	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	14.4	6.3	20.1	10.4	20.1	9.9
Carbon Dioxide	14.2	6.2	18.8	9.7	18.8	9.3
Hydrogen	31.0	13.5	36.09	18.6	36.09	17.8
Methane	15.1	6.6	19.9	10.2	19.9	9.8
Ethane	0.55	0.24	0.7	0.36	0.7	0.35
Propane	0.15	0.07	0.2	0.11	0.2	0.10
Butanes	0.07	0.03	0.1	0.5	0.1	0.05
Hydrogen Sulfide	2.84	1.24	3.0	1.55	3.0	1.48
Nitrogen	0.71	0.31	1.0	0.51	1.0	0.49
Helium	0.02	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	20.89	9.1	0	0	0	0
Water	0	56.37	0	48.46	0	50.67
Carbonyl Sulfide	0.07	0.03	0.1	0.05	0.1	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	742		546		547	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.007288		0.004560		0.005200	
Product Gas Rate, SCF/hr	2.2311		2.5658		2.5533	
Product Benzene Rate, lb-mol/hr	0.001268		0		0	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	4.0	1.97	5.4	3.2	5.1	2.87
Carbon Dioxide	22.4	11.0	28.6	17.0	29.2	16.4
Hydrogen	37.9	18.6	44.13	26.1	43.75	24.5
Methane	13.9	6.8	17.6	10.5	17.7	9.9
Ethane	0.51	0.25	0.6	0.36	0.60	0.33
Propane	0.14	0.07	0.15	0.09	0.15	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.4	1.2	2.51	1.49	2.5	1.4
Nitrogen	0.65	0.32	0.90	0.53	0.89	0.50
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	18.01	8.9	0	0	0	0
Water	0	50.84	0	40.66	0	43.96
Carbonyl Sulfide	0.08	0.04	0.1	0.06	0.10	0.05
Total	100.00	100.001	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000655		0.000818		0.0008375	
CO_2 Produced, lb-mol/hr	0.000651		0.000807		0.000840	
H_2 Produced, lb-mol/hr	0.000649		0.000815		0.000785	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.66		0.82		0.84	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959c

Table B-2, Part 4. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	61		62		63	
Feed Water Rate, lb-mol/hr	0.006387		0.007536		0.002931	
Feed Gas Rate, SCF/hr	2.2551		2.2865		2.2865	
Feed Benzene Rate, lb-mol/hr	0.000519		0		0	
Feed H_2O/Gas Ratio (mol)	1.00		1.27		0.49	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	18.5	9.2	20.9	9.2	20.9	14.0
Carbon Dioxide	17.2	8.6	19.8	8.7	19.8	13.2
Hydrogen	33.1	16.6	33.69	14.8	33.69	22.5
Methane	18.3	9.1	20.5	9.0	20.5	13.7
Ethane	0.64	0.32	0.7	0.31	0.7	0.47
Propane	0.19	0.09	0.3	0.13	0.3	0.20
Butanes	0.09	0.05	0.1	0.04	0.1	0.07
Hydrogen Sulfide	2.76	1.38	2.9	1.27	2.9	1.94
Nitrogen	0.91	0.45	1.0	0.44	1.0	0.67
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	8.21	4.07	0	0	0	0
Water	0	50.08	0	56.06	0	33.17
Carbonyl Sulfide	0.09	0.05	0.1	0.04	0.1	0.07
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	547		542		542	
Reactor Pressure, psig	1000		500		500	
Product Water Rate, lb-mol/hr	0.005200		0.006300		0.002300	
Product Gas Rate, SCF/hr	2.5516		2.5785		2.5732	
Product Benzene Rate, lb-mol/hr	0.000469		0		0	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	5.6	3.2	6.0	3.1	7.2	5.3
Carbon Dioxide	26.5	15.3	30.0	15.5	29.0	21.6
Hydrogen	40.7	23.5	41.42	21.2	41.33	30.7
Methane	16.5	9.5	18.2	9.4	18.1	13.5
Ethane	0.58	0.33	0.59	0.31	0.6	0.44
Propane	0.17	0.10	0.26	0.14	0.27	0.20
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.34	1.35	2.52	1.30	2.5	1.86
Nitrogen	0.83	0.48	0.9	0.46	0.9	0.67
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	6.68	3.9	0	0	0	0
Water	0	42.27	0	48.63	0	25.65
Carbonyl Sulfide	0.09	0.06	0.1	0.05	0.09	0.07
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000784		0.000838		0.000765	
CO_2 Produced, lb-mol/hr	0.000780		0.000839		0.000765	
H_2 Produced, lb-mol/hr	0.000776		0.000756		0.000758	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.78		0.84		0.77	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B760509594

Table B-2, Part 5. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	64		65		66	
Feed Water Rate, lb-mol/hr	0.002909		0.005831		0.007465	
Feed Gas Rate, SCF/hr	2.2403		2.2403		2.2789	
Feed Benzene Rate, lb-mol/hr	0		0		0	
Feed H_2O/Gas Ratio (mol)	0.50		1.00		1.26	
Feed Gas Composition, mol %[a]	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	20.9	13.9	20.9	10.4	20.9	9.2
Carbon Dioxide	19.7	13.1	19.7	9.8	19.7	8.7
Hydrogen	34.03	22.7	34.03	17.0	34.03	15.0
Methane	20.5	13.7	20.5	10.2	20.5	9
Ethane	0.7	0.47	0.7	0.35	0.7	0.31
Propane	0.2	0.13	0.2	0.10	0.2	0.09
Butanes	0.1	0.07	0.1	0.05	0.1	0.04
Hydrogen Sulfide	2.76	1.84	2.76	1.38	2.76	1.22
Nitrogen	1.0	0.66	1.0	0.5	1.0	0.45
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	33.5	0	50.1	0	55.94
Carbonyl Sulfide	0.1	0.07	0.1	0.05	0.1	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	653		653		750	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.00202		0.005062		0.006500	
Product Gas Rate, SCF/hr	2.5639		2.5765		2.6296	
Product Benzene Rate, lb-mol/hr	0		0		0	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	5.1	3.9	4.8	2.7	4.2	2.1
Carbon Dioxide	30.4	23.3	30.5	17.3	30.6	15.7
Hydrogen	42.1	32.3	42.96	24.2	43.3	22.2
Methane	18.2	14.0	17.9	10.2	17.7	9.1
Ethane	0.6	0.46	0.59	0.34	0.58	0.30
Propane	0.17	0.13	0.15	0.08	0.15	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.42	1.87	2.4	1.36	2.29	1.17
Nitrogen	0.90	0.69	0.89	0.51	0.87	0.45
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	23.27	0	43.25	0	48.64
Carbonyl Sulfide	0.1	0.07	0.1	0.05	0.1	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000878		0.000898		0.000956	
CO_2 Produced, lb-mol/hr	0.000875		0.000891		0.000926	
H_2 Produced, lb-mol/hr	0.000823		0.000871		0.000946	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.88		0.90		0.96	

[a] Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959e

Table B-2, Part 6. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	67		68		69	
Feed Water Rate, lb-mol/hr	0.003084		0.003215		0.006433	
Feed Gas Rate, SCF/hr	2.2789		2.2708		2.2708	
Feed Benzene Rate, lb-mol/hr	0		0.0006045		0.000621	
Feed H_2O/Gas Ratio (mol)	0.52		0.49		0.99	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	20.9	13.7	18.9	12.7	18.9	9.5
Carbon Dioxide	19.7	12.9	17.9	12.0	17.8	9.0
Hydrogen	34.03	22.4	30.9	20.7	30.8	15.5
Methane	20.5	13.5	18.6	12.4	18.6	9.3
Ethane	0.7	0.46	0.63	0.42	0.63	0.32
Propane	0.2	0.13	0.18	0.12	0.18	0.09
Butanes	0.1	0.07	0.09	0.06	0.09	0.05
Hydrogen Sulfide	2.76	1.81	2.45	1.63	2.44	1.23
Nitrogen	1.0	0.67	0.91	0.61	0.91	0.46
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	9.34	6.22	9.55	4.8
Water	0	34.28	0	33.07	0	49.69
Carbonyl Sulfide	0.1	0.07	0.1	0.06	0.09	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	750		746		746	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.001783		0.002398		0.005499	
Product Gas Rate, SCF/hr	2.5786		2.5753		2.5871	
Product Benzene Rate, lb-mol/hr	0		0.00050		0.000580	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	5.8	4.6	5.9	4.4	5.0	2.9
Carbon Dioxide	30.1	23.7	27.3	20.3	27.5	15.7
Hydrogen	41.8	33.0	38.9	28.9	39.0	22.2
Methane	18.2	14.4	16.9	12.6	16.6	9.4
Ethane	0.59	0.47	0.55	0.41	0.55	0.31
Propane	0.15	0.11	0.14	0.10	0.14	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.35	1.84	2.17	1.61	2.1	1.2
Nitrogen	0.9	0.71	0.83	0.62	0.82	0.47
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	7.22	6.2	8.19	4.81
Water	0	21.09	0	24.79	0	42.87
Carbonyl Sulfide	0.1	0.07	0.08	0.06	0.09	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000846		0.000806		0.000860	
CO_2 Produced, lb-mol/hr	0.000843		0.000804		0.000853	
H_2 Produced, lb-mol/hr	0.000784		0.000789		0.000838	
Rate of CO Conversion, 10^6 lb-mol/hr-g catalyst	0.85		0.81		0.86	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

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Table B-2, Part 7. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	70		71		72	
Feed Water Rate, lb-mol/hr	0.008338		0.008443		0.00640	
Feed Gas Rate, SCF/hr	2.2708		2.2555		2.2555	
Feed Benzene Rate, lb-mol/hr	0.000623		0.000631		0.000631	
Feed H_2O Gas Ratio (mol)	1.28		1.29		0.98	
Feed Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	18.9	8.3	18.4	8.0	18.4	9.3
Carbon Dioxide	17.8	7.8	17.7	7.7	17.7	8.9
Hydrogen	30.8	13.5	30.9	13.5	30.9	15.6
Methane	18.6	8.1	18.4	8.0	18.4	9.29
Ethane	0.63	0.28	0.63	0.27	0.63	0.32
Propane	0.18	0.08	0.18	0.08	0.18	0.09
Butanes	0.09	0.04	0.09	0.04	0.09	0.05
Hydrogen Sulfide	2.44	1.07	2.5	1.10	2.5	1.27
Nitrogen	0.91	0.40	0.89	0.39	0.89	0.45
Helium	0.01	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0.47	0.20	0.36	0.18
Phenol	0	0	0.07	0.03	0.07	0.04
Benzene	9.55	4.2	9.66	4.2	9.77	4.88
Water	0	56.18	0	56.44	0	49.57
Carbonyl Sulfide	0.09	0.04	0.09	0.04	0.09	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	746		746		746	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.00678		0.00759		0.00602	
Product Gas Rate, SCF/hr	2.6106		2.5600		2.5585	
Product Benzene Rate, lb-mol/hr	0.000617		0.000621		0.000619	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	4.3	2.2	4.87	2.4	4.9	2.7
Carbon Dioxide	28.0	14.2	27.4	13.4	27.3	14.9
Hydrogen	39.2	19.9	38.4	18.8	38.4	21.0
Methane	16.3	8.3	16.5	8.12	16.6	9.1
Ethane	0.54	0.27	0.55	0.27	0.55	0.30
Propane	0.16	0.08	0.15	0.07	0.15	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.08	1.06	2.13	1.04	2.19	1.20
Nitrogen	0.81	0.41	0.82	0.40	0.79	0.44
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0.38	0.19	0.32	0.17
Phenol	0	0	0.06	0.03	0.06	0.03
Benzene	8.51	4.2	8.63	4.17	8.64	4.69
Water	0	49.32	0	51.05	0	45.33
Carbonyl Sulfide	0.09	0.05	0.1	0.05	0.09	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000912		0.000842		0.000840	
CO_2 Produced, lb-mol/hr	0.000904		0.000841		0.000829	
H_2 Produced, lb-mol/hr	0.000885		0.000786		0.000782	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.91		0.84		0.84	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

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Table B-2, Part 8. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	73		74		75	
Feed Water Rate, lb-mol/hr	0.003100		0.00822		0.003268	
Feed Gas Rate, SCF/hr	2.2555		2.2551		2.2551	
Feed Benzene Rate, lb-mol/hr	0.000631		0.000678		0.000669	
Feed H_2O Gas Ratio (mol)	0.48		1.25		0.50	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	18.4	12.5	18.3	8.1	18.3	12.2
Carbon Dioxide	17.7	12.0	17.6	7.8	17.6	11.8
Hydrogen	30.9	20.9	30.6	13.6	30.6	20.5
Methane	18.4	12.5	18.3	8.1	18.3	12.2
Ethane	0.63	0.42	0.62	0.28	0.62	0.42
Propane	0.18	0.12	0.18	0.08	0.18	0.12
Butanes	0.09	0.06	0.09	0.04	0.09	0.06
Hydrogen Sulfide	2.5	1.71	2.5	1.11	2.5	1.67
Nitrogen	0.89	0.60	0.88	0.39	0.88	0.59
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.17	0.12	0.46	0.20	0.18	0.12
Phenol	0.07	0.05	0.08	0.03	0.08	0.05
Benzene	9.96	6.57	10.28	4.6	10.56	6.8
Water	0	32.38	0	55.62	0	33.4
Carbonyl Sulfide	0.09	0.06	0.09	0.04	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	746		561		561	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.00215		0.00741		0.00207	
Product Gas Rate, SCF/hr	2.5576		2.5316		2.5042	
Product Benzene Rate, lb-mol/hr	0.000601		0.000665		0.000621	
Product Gas Composition, mol %						
Carbon Monoxide	5.5	4.24	6.2	3.1	7.2	5.6
Carbon Dioxide	26.9	20.7	26.2	13.0	25.5	19.8
Hydrogen	38.5	29.7	37.4	18.5	37.6	29.1
Methane	16.7	12.9	16.7	8.3	16.9	13.1
Ethane	0.55	0.42	0.55	0.27	0.56	0.44
Propane	0.15	0.12	0.15	0.07	0.15	0.12
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.20	1.70	2.20	1.10	2.24	1.74
Nitrogen	0.8	0.62	0.8	0.40	0.81	0.63
Helium	0.01	0.01	0.02	0.01	0.02	0.01
Ammonia	0.14	0.11	0.41	0.20	0.15	0.12
Phenol	0.06	0.05	0.07	0.03	0.06	0.05
Benzene	8.4	6.43	9.22	4.57	8.73	6.8
Water	0	22.93	0	50.41	0	22.42
Carbonyl Sulfide	0.09	0.07	0.08	0.04	0.08	0.07
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000801		0.000745		0.000684	
CO_2 Produced, lb-mol/hr	0.000793		0.000755		0.000670	
H_2 Produced, lb-mol/hr	0.000780		0.000703		0.000666	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.80		0.74		0.68	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959h

Table B-2, Part 9. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	76		77		78	
Feed Water Rate, lb-mol/hr	0.008261		0.002978		0.009251	
Feed Gas Rate, SCF/hr	2.2551		2.2551		2.2261	
Feed Benzene Rate, lb-mol/hr	0.000652		0.000659		0.000587	
Feed H_2O/Gas Ratio (mol)	1.26		0.46		1.44	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	18.7	8.26	18.7	12.9	18.9	7.7
Carbon Dioxide	17.6	7.79	17.6	12.1	18.1	7.4
Hydrogen	31.5	13.9	31.5	21.7	30.3	12.4
Methane	17.3	7.63	17.3	11.9	18.9	7.7
Ethane	0.63	0.28	0.63	0.43	0.62	0.26
Propane	0.18	0.08	0.18	0.12	0.27	0.11
Butanes	0.09	0.04	0.09	0.06	0	0
Hydrogen Sulfide	2.50	1.11	2.50	1.73	2.07	0.85
Nitrogen	0.89	0.39	0.89	0.61	0.91	0.37
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.46	0.20	0.17	0.11	0.53	0.22
Phenol	0.07	0.03	0.08	0.05	0.07	0.03
Benzene	9.97	4.4	10.25	6.9	9.22	3.75
Water	0	55.84	0	31.32	0	59.16
Carbonyl Sulfide	0.09	0.04	0.09	0.06	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	656		656		558	
Reactor Pressure, psig	500		500		200	
Product Water Rate, lb-mol/hr	0.00740		0.00212		0.00859	
Product Gas Rate, SCF/hr	2.5582		2.5446		2.4710	
Product Benzene Rate, lb-mol/hr	0.000648		0.000532		0.000584	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	5.2	2.6	5.8	4.48	7.85	3.5
Carbon Dioxide	27.3	13.6	27.4	21.1	25.8	11.6
Hydrogen	38.9	19.3	39.4	30.4	36.8	16.6
Methane	15.4	7.7	15.8	12.2	17.3	7.8
Ethane	0.55	0.27	0.56	0.43	0.57	0.26
Propane	0.14	0.07	0.17	0.13	0.17	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.20	1.10	2.24	1.73	1.85	0.83
Nitrogen	0.79	0.39	0.81	0.62	0.82	0.37
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.38	0.19	0.14	0.11	0.47	0.21
Phenol	0.06	0.03	0.06	0.04	0.06	0.03
Benzene	8.98	4.4	7.52	5.77	8.20	3.75
Water	0	50.30	0	22.92	0	54.92
Carbonyl Sulfide	0.08	0.04	0.08	0.06	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000840		0.000808		0.000661	
CO_2 Produced, lb-mol/hr	0.000849		0.000802		0.000650	
H_2 Produced, lb-mol/hr	0.000782		0.000758		0.000653	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.84		0.81		0.66	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

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Table B-2, Part 10. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	79		80		81	
Feed Water Rate, lb-mol/hr	0.00648		0.002885		0.003162	
Feed Gas Rate, SCF/hr	2.2261		2.2261		2.2182	
Feed Benzene Rate, lb-mol/hr	0.000508		0.000896		0.000487	
Feed H_2O/Gas Ratio (mol)	1.02		0.43		0.51	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	19.1	9.4	18.0	12.6	19.2	12.8
Carbon Dioxide	18.4	9.1	17.4	12.1	18.5	12.3
Hydrogen	30.7	15.2	29.0	20.3	31.4	20.9
Methane	19.2	9.5	18.1	12.7	18.8	12.5
Ethane	0.63	0.31	0.59	0.42	0.64	0.42
Propane	0.27	0.13	0.25	0.18	0.18	0.12
Butanes	0	0	0	0	0.09	0.06
Hydrogen Sulfide	2.11	1.04	1.98	1.39	2.04	1.36
Nitrogen	0.92	0.45	0.87	0.61	0.93	0.62
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.37	0.18	0.16	0.11	0.18	0.12
Phenol	0.06	0.03	0.10	0.07	0.06	0.04
Benzene	8.13	3.97	13.44	9.35	7.87	5.17
Water	0	50.63	0	30.10	0	33.52
Carbonyl Sulfide	0.09	0.05	0.09	0.06	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	558		558		656	
Reactor Pressure, psig	200		200		200	
Product Water Rate, lb-mol/hr	0.00593		0.00221		0.002498	
Product Gas Rate, SCF/hr	2.4749		2.4627		2.4465	
Product Benzene Rate, lb-mol/hr	0.000506		0.000897		0.000455	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	7.9	4.3	8.2	6.3	8.2	6.0
Carbon Dioxide	26.1	14.1	24.2	18.5	26.3	19.3
Hydrogen	37.2	20.1	34.8	26.7	37.3	27.3
Methane	17.5	9.5	16.7	12.8	17.7	13.0
Ethane	0.57	0.31	0.55	0.42	0.58	0.43
Propane	0.17	0.09	0.16	0.13	0.16	0.12
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.87	1.01	1.78	1.37	1.83	1.34
Nitrogen	0.83	0.45	0.79	0.61	0.85	0.62
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.33	0.18	0.14	0.11	0.16	0.12
Phenol	0.05	0.03	0.10	0.07	0.05	0.03
Benzene	7.37	3.93	12.48	9.42	6.76	4.88
Water	0	45.94	0	23.50	0	26.79
Carbonyl Sulfide	0.09	0.05	0.08	0.06	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000654		0.000608		0.000645	
CO_2 Produced, lb-mol/hr	0.000655		0.000599		0.000640	
H_2 Produced, lb-mol/hr	0.000649		0.000600		0.000577	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.65		0.61		0.64	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

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Table B-2, Part 11. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	82		83		84	
Feed Water Rate, lb-mol/hr	0.006363		0.008287		0.008216	
Feed Gas Rate, SCF/hr	2.2182		2.2182		2.2241	
Feed Benzene Rate, lb-mol/hr	0.000644		0.000750		0.0006051	
Feed H_2O/Gas Ratio (mol)	0.99		1.27		1.28	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	18.7	9.4	18.4	8.1	18.8	8.3
Carbon Dioxide	18.0	9.0	17.7	7.8	18.1	7.9
Hydrogen	30.6	15.4	30.0	13.3	30.6	13.4
Methane	18.3	9.2	18.0	7.95	18.5	8.1
Ethane	0.62	0.31	0.61	0.27	0.62	0.27
Propane	0.18	0.09	0.17	0.08	0.18	0.08
Butanes	0.09	0.05	0.09	0.04	0.09	0.04
Hydrogen Sulfide	1.99	1.0	1.95	0.86	2.17	0.95
Nitrogen	0.90	0.45	0.88	0.39	0.90	0.40
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.36	0.18	0.46	0.20	0.47	0.21
Phenol	0.07	0.03	0.09	0.04	0.07	0.03
Benzene	10.08	5.0	11.54	5.0	9.39	4.1
Water	0	49.83	0	55.92	0	56.17
Carbonyl Sulfide	0.09	0.05	0.09	0.04	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	656		656		746	
Reactor Pressure, psig	200		200		200	
Product Water Rate, lb-mol/hr	0.005651		0.007549		0.007380	
Product Gas Rate, SCF/hr	2.4780		2.5012		2.5135	
Product Benzene Rate, lb-mol/hr	0.000638		0.000698		0.000587	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	7.3	4.1	6.5	3.2	6.3	3.1
Carbon Dioxide	25.9	14.4	26.1	12.8	26.7	13.1
Hydrogen	37.1	20.6	37.2	18.2	37.9	18.6
Methane	16.9	9.4	16.6	8.1	16.8	8.26
Ethane	0.56	0.31	0.55	0.07	0.56	0.27
Propane	0.16	0.09	0.15	0.07	0.15	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.76	0.98	1.73	0.85	1.85	0.91
Nitrogen	0.82	0.45	0.80	0.39	0.81	0.40
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.29	0.16	0.39	0.19	0.40	0.20
Phenol	0.06	0.03	0.07	0.03	0.06	0.03
Benzene	9.05	5.0	9.81	4.7	8.37	4.0
Water	0	44.42	0	51.15	0	51.0
Carbonyl Sulfide	0.08	0.05	0.08	0.04	0.08	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000681		0.000731		0.000757	
CO_2 Produced, lb-mol/hr	0.000678		0.000733		0.000743	
H_2 Produced, lb-mol/hr	0.000659		0.000722		0.000739	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.68		0.73		0.76	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

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Table B-2, Part 12. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	85		86		87	
Feed Water Rate, lb-mol/hr	0.003212		0.007995		0.003745	
Feed Gas Rate, SCF/hr	2.2241		2.2104		2.2104	
Feed Benzene Rate, lb-mol/hr	0.000600		0.000621		0.000728	
Feed H_2O/Gas Ratio (mol)	0.50		1.25		0.58	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	18.9	12.6	18.9	8.4	18.6	11.8
Carbon Dioxide	18.2	12.1	18.5	8.2	18.2	11.5
Hydrogen	30.7	20.4	29.5	13.1	29.0	18.4
Methane	18.5	12.3	19.0	8.4	18.3	11.8
Ethane	0.63	0.42	0.63	0.28	0.62	0.39
Propane	0.18	0.12	0.18	0.08	0.18	0.11
Butanes	0.09	0.06	0.09	0.04	0.09	0.06
Hydrogen Sulfide	2.18	1.45	2.26	1.00	2.22	1.41
Nitrogen	0.91	0.60	0.91	0.40	0.89	0.57
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.18	0.12	0	0	0	0
Phenol	0.07	0.05	0	0	0	0
Benzene	9.35	6.25	9.92	4.32	11.79	7.12
Water	0	33.46	0	55.73	0	36.77
Carbonyl Sulfide	0.09	0.06	0.09	0.04	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	746		745		745	
Reactor Pressure, psig	200		200		200	
Product Water Rate, lb-mol/hr	0.002292		0.007195		0.002556	
Product Gas Rate, SCF/hr	2.4877		2.5040		2.4917	
Product Benzene Rate, lb-mol/hr	0.000517		0.000610		0.000621	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	7.1	5.3	6.5	3.2	6.7	4.95
Carbon Dioxide	26.5	19.9	27.4	13.6	27.0	19.9
Hydrogen	38.0	28.6	36.8	18.3	36.8	27.1
Methane	17.2	12.9	17.1	8.5	17.1	12.5
Ethane	0.57	0.43	0.56	0.28	0.56	0.41
Propane	0.16	0.12	0.16	0.08	0.16	0.12
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.87	1.41	1.95	0.97	1.90	1.40
Nitrogen	0.83	0.62	0.82	0.40	0.82	0.60
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.16	0.12	0	0	0	0
Phenol	0.06	0.04	0	0	0	0
Benzene	7.44	5.57	8.61	4.29	8.26	6.44
Water	0	24.93	0	50.51	0	26.51
Carbonyl Sulfide	0.09	0.06	0.08	0.04	0.08	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000715		0.000747		0.000728	
CO_2 Produced, lb-mol/hr	0.000687		0.000769		0.000739	
H_2 Produced, lb-mol/hr	0.000693		0.000743		0.000737	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.72		0.75		0.73	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

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Table B-2, Part 13. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	88		89		90	
Feed Water Rate, lb-mol/hr	0.00275		0.005833		0.007538	
Feed Gas Rate, SCF/hr	2.2090		2.2090		2.2090	
Feed Benzene Rate, lb-mol/hr	0		0		0	
Feed H_2O/Gas Ratio (mol)	0.48		1.02		1.31	
Feed Gas Composition, mol %[c]	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	20.5	13.8	20.5	10.1	20.5	8.81
Carbon Dioxide	20.5	13.8	20.5	10.1	20.5	8.81
Hydrogen	33.98	23.1	33.98	16.8	33.98	14.7
Methane	20.5	13.9	20.5	10.2	20.5	8.86
Ethane	0.7	0.47	0.7	0.35	0.7	0.30
Propane	0.2	0.14	0.2	0.10	0.2	0.09
Butanes	0.1	0.07	0.1	0.05	0.1	0.04
Hydrogen Sulfide	2.4	1.62	2.4	1.19	2.4	1.04
Nitrogen	1.0	0.67	1.0	0.49	1.0	0.43
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	32.35	0	50.56	0	56.87
Carbonyl Sulfide	0.1	0.07	0.1	0.05	0.1	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	744		744		744	
Reactor Pressure, psig	200		200		200	
Product Water Rate, lb-mol/hr	0.00184		0.004898		0.006548	
Product Gas Rate, SCF/hr	2.5051		2.5267		2.5674	
Product Benzene Rate, lb-mol/hr	0		0		0	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	5.7	4.4	5.0	2.9	4.5	3.2
Carbon Dioxide	30.2	23.6	30.5	17.5	30.5	15.4
Hydrogen	41.76	32.6	42.4	24.2	43.39	21.8
Methane	18.5	14.4	18.3	10.5	17.9	9.1
Ethane	0.62	0.48	0.61	0.35	0.60	0.30
Propane	0.18	0.14	0.17	0.09	0.16	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.05	1.59	2.04	1.16	1.99	1.00
Nitrogen	0.88	0.68	0.87	0.50	0.85	0.43
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0	0	0	0	0	0
Phenol	0	0	0	0	0	0
Benzene	0	0	0	0	0	0
Water	0	22.03	0	42.74	0	49.53
Carbonyl Sulfide	0.09	0.07	0.09	0.05	0.09	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000803		0.000837		0.000865	
CO_2 Produced, lb-mol/hr	0.000800		0.000836		0.000866	
H_2 Produced, lb-mol/hr	0.000771		0.000824		0.000931	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.80		0.84		0.87	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

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Table B-2, Part 14. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	91		92		93	
Feed Water Rate, lb-mol/hr	0.008076		0.003377		0.00780	
Feed Gas Rate, SCF/hr	2.2241		2.2241		2.2315	
Feed Benzene Rate, lb-mol/hr	0		0		0.000577	
Feed H_2O/Gas Ratio (mol)	1.40		0.58		1.22	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	9.5	3.96	9.5	6.0	8.8	3.96
Carbon Dioxide	20.3	8.46	20.3	12.8	17.9	8.07
Hydrogen	38.89	16.2	38.89	24.5	34.9	15.7
Methane	26.1	10.9	26.1	16.5	23.1	10.4
Ethane	0.9	0.38	0.9	0.57	1.9	0.86
Propane	0.3	0.12	0.3	0.19	0.27	0.12
Butanes	0.1	0.04	0.1	0.06	0.09	0.04
Hydrogen Sulfide	2.3	0.96	2.3	1.45	2.1	0.94
Nitrogen	1.5	0.63	1.5	0.95	1.36	0.61
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0.44	0.20
Phenol	0	0	0	0	0.07	0.03
Benzene	0	0	0	0	8.97	4.1
Water	0	58.3	0	36.91	0	54.92
Carbonyl Sulfide	0.1	0.04	0.1	0.06	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	745		745		746	
Reactor Pressure, psig	200		200		200	
Product Water Rate, lb-mol/hr	0.007504		0.001959		0.00734	
Product Gas Rate, SCF/hr	2.3835		2.3623		2.3492	
Product Benzene Rate, lb-mol/hr	0		0		0.000569	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	2.04	0.92	2.9	2.2	2.85	1.36
Carbon Dioxide	25.8	11.7	25.1	19.0	22.5	10.8
Hydrogen	43.0	19.4	42.63	32.3	38.6	18.4
Methane	24.5	11.1	24.6	18.7	22.4	10.7
Ethane	0.81	0.37	0.89	0.68	1.37	0.65
Propane	0.24	0.11	0.24	0.19	0.18	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	2.10	0.95	2.11	1.61	1.57	0.75
Nitrogen	1.40	0.64	1.42	1.08	1.3	0.62
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Ammonia	0	0	0	0	0.39	0.19
Phenol	0	0	0	0	0.06	0.03
Benzene	0	0	0	0	8.68	4.1
Water	0	55.24	0	24.16	0	52.27
Carbonyl Sulfide	0.1	0.4	0.1	0.07	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000422		0.000370		0.000371	
CO_2 Produced, lb-mol/hr	0.000430		0.000365		0.000369	
H_2 Produced, lb-mol/hr	0.000410		0.000367		0.000347	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.42		0.37		0.37	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959n

Table B-2, Part 15. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	94		95		96	
Feed Water Rate, lb-mol/hr	0.004837		0.003352		0.008402	
Feed Gas Rate, SCF/hr	2.2315		2.2261		2.2261	
Feed Benzene Rate, lb-mol/hr	0.000817		0.000604		0.000631	
Feed H_2O/Gas Ratio (mol)	0.73		0.52		1.30	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	8.5	4.9	8.6	5.6	8.5	3.7
Carbon Dioxide	17.3	10.0	17.9	11.7	17.7	7.7
Hydrogen	33.7	19.5	37.5	24.6	37.3	16.2
Methane	22.3	12.9	22.5	14.8	22.3	9.7
Ethane	1.8	1.1	1.36	0.89	1.35	0.58
Propane	0.26	0.15	0.19	0.12	0.19	0.08
Butanes	0.09	0.05	0.09	0.06	0.09	0.04
Hydrogen Sulfide	2.00	1.16	2.08	1.36	2.1	0.89
Nitrogen	1.31	0.76	1.36	0.89	1.35	0.58
Helium	0.01	0.01	0.02	0.01	0.02	0.01
Ammonia	0.26	0.15	0.19	0.12	0.47	0.21
Phenol	0.09	0.05	0.07	0.05	0.07	0.03
Benzene	12.29	7.1	8.05	6.2	8.47	4.2
Water	0	42.12	0	33.54	0	56.04
Carbonyl Sulfide	0.09	0.05	0.09	0.06	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	746		661		661	
Reactor Pressure, psig	200		200		200	
Product Water Rate, lb-mol/hr	0.00306		0.00300		0.00669	
Product Gas Rate, SCF/hr	2.3444		2.3725		2.3829	
Product Benzene Rate, lb-mol/hr	0.000788		0.000598		0.000588	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	2.9	2.0	3.3	2.3	3.0	1.51
Carbon Dioxide	21.8	15.1	21.6	14.9	21.7	10.9
Hydrogen	37.2	25.7	40.0	27.7	39.8	20.0
Methane	21.8	15.1	21.5	14.9	21.9	11.0
Ethane	1.6	1.1	1.28	0.89	1.19	0.60
Propane	0.17	0.12	0.15	0.10	0.16	0.08
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.51	1.05	1.57	1.09	1.61	0.82
Nitrogen	1.25	0.86	1.28	0.89	1.28	0.64
Helium	0.01	0.01	0.02	0.01	0.02	0.01
Ammonia	0.15	0.10	0.16	0.11	0.36	0.18
Phenol	0.09	0.06	0.07	0.05	0.06	0.03
Benzene	11.43	7.92	8.98	6.1	8.83	4.4
Water	0	30.82	0	30.90	0	49.79
Carbonyl Sulfide	0.09	0.06	0.09	0.06	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000363		0.000324		0.000345	
CO_2 Produced, lb-mol/hr	0.000355		0.000312		0.000327	
H_2 Produced, lb-mol/hr	0.000321		0.000304		0.000296	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.36		0.32		0.35	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959o

Table B-2, Part 16. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	97		98		99	
Feed Water Rate, lb-mol/hr	0.008321		0.003461		0.002846	
Feed Gas Rate, SCF/hr	2.2183		2.2183		2.2325	
Feed Benzene Rate, lb-mol/hr	0.000607		0.000540		0.000616	
Feed H_2O/Gas Ratio (mol)	1.30		0.55		0.44	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	8.5	3.7	8.7	5.6	9.0	6.2
Carbon Dioxide	17.8	7.7	18.0	11.7	18.8	13.0
Hydrogen	35.4	15.4	35.9	23.2	33.6	23.3
Methane	22.9	9.97	23.2	15.0	23.5	16.3
Ethane	1.34	0.58	1.36	0.88	1.35	0.94
Propane	0.27	0.11	0.27	0.17	0.26	0.18
Butanes	0.09	0.04	0.09	0.06	0.09	0.06
Hydrogen Sulfide	2.1	0.89	2.09	1.35	2.07	1.43
Nitrogen	1.34	0.58	1.36	0.88	1.35	0.94
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.47	0.21	0.20	0.13	0.16	0.11
Phenol	0.07	0.03	0.06	0.04	0.07	0.05
Benzene	9.61	4.1	8.66	5.5	9.64	6.6
Water	0	56.64	0	35.42	0	30.82
Carbonyl Sulfide	0.09	0.04	0.09	0.06	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	560		560		538	
Reactor Pressure, psig	200		200		500	
Product Water Rate, lb-mol/hr	0.00797		0.00290		0.00249	
Product Gas Rate, SCF/hr	2.3417		2.3248		2.3572	
Product Benzene Rate, lb-mol/hr	0.000598		0.000499		0.000601	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	3.5	1.6	3.8	2.6	3.4	2.51
Carbon Dioxide	21.6	9.8	21.8	15.1	22.9	16.7
Hydrogen	38.3	17.5	39.0	27.1	37.1	27.0
Methane	22.5	10.3	22.6	15.7	22.9	16.7
Ethane	1.2	0.55	1.31	0.91	1.20	0.88
Propane	0.16	0.07	0.17	0.11	0.16	0.12
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.88	0.86	1.95	1.35	1.68	1.23
Nitrogen	1.28	0.59	1.31	0.91	1.29	0.94
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.40	0.18	0.16	0.11	0.13	0.10
Phenol	0.06	0.03	0.05	0.03	0.06	0.05
Benzene	9.01	4.1	7.74	5.3	9.07	6.5
Water	0	54.37	0	30.71	0	27.2
Carbonyl Sulfide	0.09	0.04	0.09	0.06	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000312		0.000301		0.000347	
CO_2 Produced, lb-mol/hr	0.000298		0.000287		0.000335	
H_2 Produced, lb-mol/hr	0.000301		0.000292		0.000329	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.31		0.30		0.35	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959p

Table B-2, Part 17. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	100		101		102	
Feed Water Rate, lb-mol/hr	0.008608		0.008107		0.003192	
Feed Gas Rate, SCF/hr	2.2325		2.2473		2.2473	
Feed Benzene Rate, lb-mol/hr	0.000496		0.000621		0.000597	
Feed H_2O/Gas Ratio (mol)	1.34		1.25		0.49	
Feed Gas Composition, mol %[a]	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	9.0	3.85	9.3	4.1	9.3	6.2
Carbon Dioxide	18.7	8.0	18.7	8.3	18.8	12.6
Hydrogen	33.6	14.4	33.5	14.9	33.7	22.6
Methane	23.5	10.1	23.5	10.4	23.6	15.8
Ethane	1.35	0.58	1.35	0.60	1.36	0.91
Propane	0.26	0.11	0.27	0.12	0.27	0.18
Butanes	0.09	0.04	0.09	0.04	0.09	0.06
Hydrogen Sulfide	2.07	0.88	1.80	0.80	1.81	1.21
Nitrogen	1.35	0.58	1.35	0.60	1.36	0.91
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.49	0.21	0.45	0.20	0.18	0.12
Phenol	0.07	0.03	0.07	0.03	0.07	0.05
Benzene	9.41	3.97	9.51	4.25	9.35	6.1
Water	0	57.19	0	55.61	0	33.19
Carbonyl Sulfide	0.09	0.04	0.09	0.04	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	538		660		660	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.006951		0.007705		0.002792	
Product Gas Rate, SCF/hr	2.3498		2.3921		2.3867	
Product Benzene Rate, lb-mol/hr	0.000496		0.000615		0.000500	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	3.3	1.6	3.0	1.4	3.4	2.3
Carbon Dioxide	23.8	11.6	23.5	11.0	23.6	16.7
Hydrogen	37.1	18.1	36.6	17.2	36.7	25.9
Methane	23.6	11.5	23.1	10.9	24.2	17.1
Ethane	1.21	0.59	1.28	0.60	1.30	0.92
Propane	0.15	0.07	0.16	0.08	0.15	0.10
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.41	0.69	1.39	0.65	1.40	0.99
Nitrogen	1.31	0.64	1.28	0.60	1.31	0.93
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.38	0.19	0.41	0.19	0.15	0.11
Phenol	0.05	0.03	0.07	0.03	0.06	0.04
Benzene	7.58	3.7	9.10	4.2	7.62	5.3
Water	0	51.24	0	53.10	0	29.54
Carbonyl Sulfide	0.09	0.04	0.09	0.04	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000362		0.000397		0.000382	
CO_2 Produced, lb-mol/hr	0.000369		0.000389		0.000374	
H_2 Produced, lb-mol/hr	0.000296		0.000330		0.000286	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.36		0.40		0.38	

[a] Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959q

Table B-2, Part 18. KINETICS TESTS
(Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	103		104		105	
Feed Water Rate, lb-mol/hr	0.008369		0.002542		0.008352	
Feed Gas Rate, SCF/hr	2.2501		2.2501		2.2473	
Feed Benzene Rate, lb-mol/hr	0.000609		0.000476		0.000621	
Feed H_2O/Gas Ratio (mol)	1.29		0.40		1.28	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	9.3	4.0	9.5	6.8	8.9	3.9
Carbon Dioxide	18.7	8.2	19.2	13.7	18.2	7.9
Hydrogen	33.6	14.7	34.4	24.5	33.8	14.8
Methane	23.5	10.3	24.1	17.2	24.0	10.5
Ethane	1.35	0.59	1.38	0.99	1.35	0.59
Propane	0.27	0.11	0.28	0.20	0.27	0.12
Butanes	0.09	0.04	0.09	0.07	0.09	0.04
Hydrogen Sulfide	1.80	0.79	1.85	1.32	1.80	0.79
Nitrogen	1.35	0.59	1.38	0.99	1.35	0.59
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.47	0.20	0.15	0.10	0.47	0.20
Phenol	0.07	0.03	0.06	0.04	0.07	0.03
Benzene	9.39	4.1	7.50	5.3	9.59	4.2
Water	0	56.3	0	28.71	0	56.29
Carbonyl Sulfide	0.09	0.04	0.09	0.07	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	745		745		744	
Reactor Pressure, psig	500		500		1000	
Product Water Rate, lb-mol/hr	0.00782		0.001953		0.00789	
Product Gas Rate, SCF/hr	2.3968		2.3983		2.4024	
Product Benzene Rate, lb-mol/hr	0.000595		0.000421		0.000582	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	2.8	1.27	3.2	2.4	2.5	1.17
Carbon Dioxide	23.6	10.7	24.1	18.7	23.1	10.7
Hydrogen	37.5	16.9	38.5	29.7	38.4	17.8
Methane	22.6	10.2	23.3	18.0	22.6	10.5
Ethane	1.19	0.54	1.31	1.00	1.27	0.59
Propane	0.22	0.10	0.25	0.19	0.25	0.12
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.38	0.63	1.39	1.08	1.36	0.63
Nitrogen	1.28	0.58	1.32	1.02	1.27	0.59
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.42	0.19	0.11	0.08	0.42	0.20
Phenol	0.06	0.03	0.04	0.03	0.06	0.03
Benzene	8.84	3.92	6.37	4.9	8.66	4.1
Water	0	54.89	0	22.82	0	53.52
Carbonyl Sulfide	0.09	0.04	0.09	0.07	0.09	0.04
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000408		0.000395		0.000406	
CO_2 Produced, lb-mol/hr	0.000413		0.000395		0.000393	
H_2 Produced, lb-mol/hr	0.000395		0.000380		0.000431	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.41		0.40		0.41	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959r

Table B-2, Part 19. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	106		107		108	
Feed Water Rate, lb-mol/hr	0.003326		0.008264		0.00300	
Feed Gas Rate, SCF/hr	2.2473		2.2789		2.2789	
Feed Benzene Rate, lb-mol/hr	0.000727		0.000764		0.000766	
Feed H_2O/Gas Ratio (mol)	0.51		1.23		0.45	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	8.7	5.8	8.7	3.9	8.7	6.0
Carbon Dioxide	18.6	12.3	18.3	8.2	18.4	12.7
Hydrogen	32.8	21.80	32.7	14.6	32.8	22.6
Methane	24.0	15.90	23.5	10.5	23.6	16.3
Ethane	1.38	0.93	1.32	0.59	1.33	0.92
Propane	0.27	0.18	0.27	0.12	0.27	0.19
Butanes	0.09	0.06	0.09	0.04	0.09	0.06
Hydrogen Sulfide	1.78	1.18	1.75	0.79	1.76	1.22
Nitrogen	1.34	0.89	1.32	0.59	1.33	0.92
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.16	0.11	0.45	0.20	0.16	0.11
Phenol	0.09	0.06	0.08	0.04	0.09	0.06
Benzene	10.68	7.08	11.41	5.1	11.36	7.9
Water	0	33.64	0	55.28	0	30.95
Carbonyl Sulfide	0.09	0.06	0.09	0.04	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	744		658		658	
Reactor Pressure, psig	1000		1000		1000	
Product Water Rate, lb-mol/hr	0.002462		0.006831		0.002588	
Product Gas Rate, SCF/hr	2.3786		2.4292		2.4030	
Product Benzene Rate, lb-mol/hr	0.000683		0.000725		0.000671	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet	Dry	Wet
Carbon Monoxide	2.9	2.12	2.8	1.4	3.0	2.2
Carbon Dioxide	23.1	16.86	22.9	11.6	22.8	16.6
Hydrogen	36.6	26.72	37.2	18.9	36.6	26.6
Methane	23.1	16.86	22.2	11.3	22.4	16.4
Ethane	1.27	0.94	1.25	0.64	1.26	0.92
Propane	0.25	0.18	0.25	0.13	0.26	0.19
Butanes	0	0	0	0	0	0
Hydrogen Sulfide	1.33	0.98	1.33	0.68	1.31	0.96
Nitrogen	1.27	0.94	1.26	0.64	1.27	0.93
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Ammonia	0.14	0.09	0.35	0.18	0.13	0.10
Phenol	0.06	0.0-	0.08	0.04	0.07	0.05
Benzene	9.87	7.28	10.28	5.22	10.79	7.0
Water	0	26.72	0	49.22	0	27.98
Carbonyl Sulfide	0.09	0.06	0.08	0.04	0.09	0.06
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000372		0.000392		0.000375	
CO_2 Produced, lb-mol/hr	0.000362		0.000381		0.000362	
H_2 Produced, lb-mol/hr	0.000355		0.000431		0.000359	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.37		0.39		0.38	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B76050959a

Table B-2, Part 20. KINETICS TESTS (Girdler G-93 Catalyst, 4 x 6 Mesh Spheres, 10.02 g)

Run No.	109		110	
Feed Water Rate, lb-mol/hr	0.002876		0.008452	
Feed Gas Rate, SCF/hr	2.2413		2.2413	
Feed Benzene Rate, lb-mol/hr	0.000762		0.000669	
Feed H_2O/Gas Ratio (mol)	0.44		1.30	
Feed Gas Composition, mol %*	Dry	Wet	Dry	Wet
Carbon Monoxide	8.7	6.1	8.8	3.8
Carbon Dioxide	18.3	12.8	18.6	8.1
Hydrogen	32.7	22.8	33.1	14.4
Methane	23.6	16.4	23.8	10.4
Ethane	1.32	0.92	1.33	0.58
Propane	0.26	0.18	0.26	0.11
Butanes	0.09	0.06	0.09	0.04
Hydrogen Sulfide	1.76	1.22	1.78	0.77
Nitrogen	1.32	0.92	1.33	0.58
Helium	0.02	0.01	0.02	0.01
Ammonia	0.16	0.11	0.47	0.21
Phenol	0.09	0.06	0.08	0.03
Benzene	11.59	8.0	10.25	4.5
Water	0	30.36	0	56.43
Carbonyl Sulfide	0.09	0.06	0.09	0.04
Total	100.00	100.00	100.00	100.00
Reactor Temperature, °F	557		557	
Reactor Pressure, psig	1000		1000	
Product Water Rate, lb-mol/hr	0.00225		0.00711	
Product Gas Rate, SCF/hr	2.4181		2.4061	
Product Benzene Rate, lb-mol/hr	0.000645		0.000650	
Product Gas Composition, mol %	Dry	Wet	Dry	Wet
Carbon Monoxide	2.5	1.9	2.4	1.2
Carbon Dioxide	23.2	17.6	23.3	11.5
Hydrogen	36.8	27.8	36.9	18.2
Methane	23.5	17.8	23.2	11.4
Ethane	1.30	0.98	1.26	0.62
Propane	0.22	0.16	0.22	0.11
Butanes	0	0	0	0
Hydrogen Sulfide	1.41	1.07	1.39	0.68
Nitrogen	1.25	0.95	1.26	0.62
Helium	0.02	0.01	0.02	0.01
Ammonia	0.12	0.09	0.37	0.18
Phenol	0.07	0.05	0.07	0.04
Benzene	9.52	7.0	9.52	4.6
Water	0	24.52	0	50.8
Carbonyl Sulfide	0.09	0.07	0.09	0.04
Total	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000401		0.000408	
CO_2 Produced, lb-mol/hr	0.000406		0.000404	
H_2 Produced, lb-mol/hr	0.000397		0.000398	
Rate of CO Conversion, 10^4 lb-mol/hr-g catalyst	0.40		0.41	

*Feed gas also contains 1.8 ppm propyl mercaptan and 0.8 ppm thiophene.

B760509591

Table B-3, Part 1. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	1		2		3		4		5		6		7		8		9		10		11		12	
Feed Water Rate, lb-mol/hr	0.000833		0.001108		0.000822		0.003289		0.003139		0.003144		0.005683		0.004182		0.004047		[illegible]		0.001452		0.003240	
Feed Gas Rate, SCF/hr	2.4104		2.2148		2.2148		2.2339		2.2339		2.2339		2.1968		2.1968		2.1968		[illegible]		2.1965		2.1956	
Feed Benzene Rate, lb-mol/hr	---		---		---		---		---		---		---		---		---		---		---		---	
Feed H_2O/Gas Ratio (mol)	1.40		1.41		1.38		0.55		0.54		0.54		1.20		1.40		1.38		0.66		0.97		0.97	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %																								
Carbon Monoxide	13.20	5.46	13.20	5.48	13.20	5.51	13.20	8.40	13.29	8.56	13.20	8.55	13.1	5.97	13.1	5.34	13.1	5.43	[illegible]	7.79	13.1	8.32	13.1	8.35
Carbon Dioxide	16.43	6.81	16.43	6.80	16.43	6.85	16.43	10.46	16.45	10.64	16.43	10.63	16.32	7.43	16.32	6.65	16.32	6.82	[illegible]	9.69	16.32	10.34	16.32	10.38
Hydrogen	37.47	15.57	37.47	15.56	37.47	15.64	37.47	24.10	37.47	24.33	37.47	24.32	37.58	17.13	37.58	15.33	37.58	15.64	[illegible]	22.46	37.58	23.86	37.58	22.93
Methane	27.18	11.29	27.18	11.29	27.18	11.32	27.18	17.43	27.18	17.64	27.18	17.63	27.38	12.49	27.38	11.18	27.38	11.47	[illegible]	16.30	27.38	17.39	27.38	17.46
Ethane	1.10	0.46	1.10	0.45	1.10	0.46	1.10	0.71	1.10	0.72	1.10	0.72	1.1	0.50	1.1	0.45	1.1	0.46	[illegible]	0.66	1.1	0.70	1.1	0.70
Propane	0.80	0.33	0.80	0.33	0.80	0.33	0.80	0.51	0.80	0.51	0.80	0.51	0.8	0.36	0.8	0.33	0.8	0.33	0.8	0.48	0.8	0.51	0.8	0.51
Butanes	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.07	0.10	0.07	0.10	0.07	0.1	0.05	0.1	0.04	0.1	0.04	0.1	0.06	0.1	0.07	0.1	0.07
Hydrogen Sulfide	2.40	0.99	2.40	1.00	2.40	1.01	2.40	1.55	2.40	1.55	2.40	1.55	2.3	1.04	2.3	0.94	2.3	0.96	2.3	1.37	2.3	1.46	2.3	1.46
Nitrogen	1.20	0.47	1.20	0.50	1.20	0.50	1.20	0.76	1.20	0.76	1.20	0.76	1.2	0.54	1.2	0.49	1.2	0.49	1.2	0.71	1.2	0.76	1.2	0.76
Helium	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.06	0.10	0.07	0.10	0.07	0.1	0.05	0.1	0.04	0.1	0.04	0.1	0.06	0.1	0.07	0.1	0.07
Benzene	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Water	---	58.48	---	58.51	---	58.27	---	35.62	---	35.14	---	35.15	---	54.42	---	56.51	---	56.52	---	48.54	---	36.44	---	36.28
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	561		665		725		[illegible]		650		752		561		656		751		[illegible]		662		749	
Reactor Pressure, psig	1000		1000		1000		1000		1000		1000		1000		1000		1000		[illegible]		1000		1000	
Product Water Rate, lb-mol/hr	0.000908		0.001748		0.000700		0.001781		0.002015		0.002342		0.005681		0.006859		0.006014		0.002810		0.002107		0.002143	
Product Gas Rate, SCF/hr	2.4140		2.4491		2.4462		2.4363		2.4630		2.4721		2.4050		2.4205		2.4294		2.3675		2.4217		2.4104	
Product Benzene Rate, lb-mol/hr	---		---		---		---		---		---		---		---		---							
Product Gas Composition, mol %																								
Carbon Monoxide	3.30	1.37	2.44	1.16	1.60	0.76	1.00	[illegible]	0.92	1.90	2.15	1.52	3.63	1.89	2.54	1.19	2.44	1.17	4.76	3.21	3.53	2.61	3.20	2.38
Carbon Dioxide	23.76	11.31	24.14	11.46	25.04	12.22	23.25	16.15	21.92	14.18	23.15	16.91	23.43	12.25	24.25	11.57	24.10	12.86	20.92	15.35	23.41	17.49	23.63	17.58
Hydrogen	43.04	20.45	44.62	21.06	43.06	21.55	42.15	33.05	42.37	31.08	44.70	33.23	42.72	22.40	42.41	20.79	43.36	23.24	44.42	26.96	42.36	32.07	43.07	32.11
Methane	24.88	11.83	24.56	11.96	24.34	13.33	24.95	26.71	24.74	19.90	25.38	19.50	25.26	13.29	24.55	12.07	24.85	12.30	25.16	17.51	25.28	19.00	25.08	18.80
Ethane	1.01	0.48	1.01	0.49	1.01	0.49	1.00	0.79	1.01	1.76	1.01	0.76	1.00	0.52	1.01	0.47	1.00	0.48	1.01	0.68	1.00	0.75	1.00	0.74
Propane	0.68	0.33	0.71	0.34	0.66	0.34	0.61	0.56	0.76	0.54	0.70	0.53	0.69	0.36	0.69	0.31	0.69	0.48	0.69	0.52	0.69	0.52	0.69	0.51
Butanes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	2.00	0.98	2.00	0.97	2.01	0.98	2.11	1.69	2.08	1.59	2.08	1.59	2.00	1.04	2.00	0.96	2.00	0.97	2.00	1.36	2.01	1.48	2.00	1.48
Nitrogen	1.11	0.53	1.08	0.53	1.10	0.53	1.10	0.83	1.11	0.82	1.11	0.84	1.11	0.57	1.10	0.52	1.11	0.54	1.10	0.75	1.10	0.82	1.11	0.81
Helium	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.10	0.05	0.10	0.05	0.10	0.05	0.10	0.08	0.10	0.08	0.10	0.08	0.10	0.06	0.10	0.05	0.10	0.06	0.10	0.07	0.10	0.08	0.10	0.07
Benzene	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Water	---	52.51	---	53.57	---	53.14	---	[illegible]	---	32.91	---	24.15	---	47.62	---	52.04	---	51.01	---	41.43	---	29.17	---	29.52
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000550		0.000610		0.000657		0.000713		0.000705		0.000615		0.000510		0.000545		0.000594		0.000459		0.000532		0.000542	
CO_2 Produced, lb-mol/hr	0.000458		0.000631		0.000650		0.000510		0.000661		0.000611		0.000531		0.000631		0.000602		0.000434		0.000536		0.000548	
H_2 Produced, lb-mol/hr	0.000548		0.000620		0.000660		[illegible]		0.000701		0.000624		0.000525		0.000585		0.000599		[illegible]		0.000529		0.000550	
Rate of CO Conversion, lb/	0.55		0.61		0.65		[illegible]		[illegible]		0.61		0.51		[illegible]		[illegible]		[illegible]		0.53		[illegible]	

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm dimethyl disulfides.

Table B-3, Part 2. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	13		14		15		16		17		18		19		20		21		22		23		24	
Feed Water Rate, lb-mol/hr	0.006467		0.006087		0.006035		0.007349		0.008561		0.008132		0.003176		0.003028		0.[illegible]		0.006360		0.006262		0.006927	
Feed Gas Rate, SCF/hr	2.2043		2.2043		2.2043		2.2313		2.2113		2.2173		2.2019		2.2019		2		2.2339		2.2339		2.2111	
Feed Benzene Rate, lb-mol/hr	---		---		---		---		---		---		---		---		-		---		---		---	
Feed H_2O/Gas Ratio (mol)	1.13		1.07		1.06		1.28		1.49		1.41		0.56		0.53		1.06		1.05		1.07		1.37	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %																								
Carbon Monoxide	13.17	6.15	13.16	6.35	13.14	6.36	15.21	6.87	15.23	6.10	15.23	6.29	15.22	9.77	15.27	9.94	15.23	1.56	15.22	7.42	15.25	7.34	14.65	6.04
Carbon Dioxide	16.22	7.65	16.23	7.90	16.25	7.91	14.17	6.18	14.14	5.66	14.06	5.83	14.07	9.06	14.00	9.22	14.07	5.83	14.06	6.89	14.03	6.82	14.32	6.01
Hydrogen	37.61	17.64	37.71	18.26	37.61	18.24	40.62	17.85	40.65	16.34	40.71	16.85	40.71	26.15	40.73	26.60	40.70	19.[illegible]	40.72	19.67	40.72	19.67	40.33	16.81
Methane	27.38	12.86	27.38	14.83	27.38	13.29	24.38	10.61	24.38	9.71	24.38	10.01	24.38	16.55	24.38	16.62	24.38	11.38	24.38	11.78	24.38	11.69	24.34	10.34
Ethane	1.1	0.51	1.1	0.53	1.1	0.53	1.0	0.44	1.0	0.38	1.0	0.40	1.0	0.64	1.0	0.65	1.0	0.48	1.0	0.49	1.0	0.49	1.1	0.46
Propane	0.8	0.38	0.8	0.39	0.8	0.39	0.8	0.34	0.8	0.31	0.8	0.32	0.8	0.52	0.8	0.53	0.8	0.38	0.8	0.39	0.8	0.39	0.8	0.33
Butanes	0.1	0.05	0.1	0.05	0.1	0.05	0.1	0.04	0.1	0.04	0.1	0.04	0.1	0.06	0.1	0.07	0.1	0.05	0.1	0.05	0.1	0.05	0.1	0.04
Hydrogen Sulfide	2.3	1.07	2.3	1.11	2.3	1.11	2.6	1.08	2.6	0.99	2.6	1.03	2.6	1.67	2.6	1.69	2.6	1.26	2.6	1.27	2.6	1.26	2.6	1.09
Nitrogen	1.2	0.57	1.1	0.53	1.2	0.58	1.2	0.50	1.2	0.45	1.2	0.47	1.2	0.78	1.2	0.79	1.2	0.58	1.2	0.59	1.2	0.58	1.2	0.50
Helium	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.1	0.05	0.1	0.05	0.1	0.05	0.1	0.04	0.1	0.04	0.1	0.04	0.1	0.06	0.1	0.07	0.1	0.05	0.1	0.05	0.1	0.05	0.1	0.04
Benzene	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Water	---	53.05	---	50.43	---	51.44	---	56.24	---	50.97	---	50.71	---	36.73	---	34.61	---	51.57	---	51.16	---	---	---	56.68
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	566		563		750		563		650		753		554		562		460		603		746		564	
Reactor Pressure, psig	500		500		500		200		200		200		200		200		200		200		200		100	
Product Water Rate, lb-mol/hr	0.005107		0.004813		0.004642		0.006210		0.007254		0.006711		0.002043		0.001861		0.004777		0.005004		0.004979		0.006560	
Product Gas Rate, SCF/hr	2.3945		2.3208		2.4296		2.4277		2.4543		2.4180		2.3992		2.4164		2.4445		2.4712		2.4712		2.3196	
Product Benzene Rate, lb-mol/hr	---		---		---		---		---		---		---		---		---		---		---		---	
Product Gas Composition, mol %																								
Carbon Monoxide	4.13	2.26	2.83	1.60	2.72	1.56	4.85	2.44	4.35	1.89	3.61	1.71	5.15	4.34	4.86	3.74	5.33	3.05	4.72	2.44	4.23	2.58	9.44	3.55
Carbon Dioxide	22.83	12.56	23.86	13.62	24.04	13.91	21.72	11.04	22.58	10.62	22.75	11.34	21.15	16.13	21.70	17.01	21.34	12.35	22.26	12.44	22.27	12.56	18.26	6.84
Hydrogen	42.64	23.43	43.41	24.72	43.14	25.04	46.13	23.42	46.35	21.92	46.46	22.52	45.42	34.56	45.81	35.72	45.83	26.29	46.02	26.16	46.10	26.22	43.11	20.47
Methane	25.48	14.03	25.08	14.30	25.16	14.61	22.26	11.33	21.98	10.14	21.98	10.46	22.48	17.23	22.48	17.43	22.48	12.83	22.28	12.56	22.26	12.61	23.98	11.36
Ethane	1.00	0.55	1.01	0.56	1.00	0.57	0.9	0.45	0.91	0.42	0.92	0.43	0.92	0.67	0.91	0.68	0.90	0.51	0.90	0.50	0.91	0.51	1.06	0.47
Propane	0.69	0.38	0.69	0.40	0.70	0.40	0.7	0.35	0.71	0.33	0.71	0.33	0.72	0.53	0.70	0.53	0.71	0.40	0.70	0.39	0.69	0.39	0.69	0.31
Butanes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	2.00	1.09	2.0	1.23	2.00	1.14	2.21	1.10	2.27	1.08	2.26	1.11	2.28	1.75	2.31	1.77	2.31	1.30	2.33	1.26	2.31	1.24	2.42	1.05
Nitrogen	1.10	0.60	1.00	0.56	1.10	0.63	1.10	0.55	1.11	0.51	1.11	0.53	1.10	0.83	1.09	0.85	1.08	0.65	1.10	0.61	1.09	0.61	1.09	0.52
Helium	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.10	0.06	0.10	0.06	0.10	0.06	0.10	0.05	0.10	0.04	0.10	0.05	0.10	0.07	0.10	0.07	0.10	0.06	0.10	0.06	0.10	0.06	0.10	0.05
Benzene	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Water	---	45.09	---	43.04	---	42.66	---	49.22	---	52.79	---	51.37	---	35.91	---	32.13	---	46.60	---	43.21	---	43.25	---	51.76
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000495		0.000574		0.000580		0.000570		0.000617		0.000646		0.000514		0.000565		0.000549		0.000605		0.000612		0.000472	
CO_2 Produced, lb-mol/hr	0.000431		0.000569		0.000541		0.000565		0.000625		0.000623		0.000514		0.000563		0.000548		0.000612		0.000618		0.000475	
H_2 Produced, lb-mol/hr	0.000496		0.000560		0.000471		0.000563		0.000620		0.000583		0.000502		0.000547		0.000540		0.000611		0.000618		0.000474	
Rate of CO Conversion, 10⁴	0.50		0.57		0.58		0.57		0.62		0.65		0.51		0.57		0.55		0.61		0.61		0.47	

* Feed also contains 4.3 ppm ethyl mercaptan, 1.0 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 3. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	25		26		27		28		29		30		31		32		33		34		35		36	
Feed Water Rate, lb-mol/hr	0.00[illegible]		0.007884		0.002904		0.002944		0.002943		0.002931		0.002946		0.002941		0.002922		0.002921		0.002914		0.002940	
Feed Gas Rate, SCF/hr	2.2[illegible]		2.2097		2.2315		2.2334		2.2315		2.2384		2.2369		2.2359		2.2356		2.2358		2.2315		2.2356	
Feed Benzene Rate, lb-mol/hr	---		---		---		---		---		---		---		---		---		---		---		---	
Feed H_2O/Gas Ratio (mol)	1.[illegible]		1.37		0.60		0.61		0.62		0.62		0.61		1.28		1.38		1.28		0.6007[illegible]		0.6007[illegible]	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %																								
Carbon Monoxide	14.[illegible]	6.[illegible]	14.68	5.15	14.68	9.71	14.68	9.68	14.68	9.64	4.32	10.06	14.32	9.40	14.32	6.24	14.32	6.05	14.32	6.05	17.11	7.76	17.14	7.[illegible]
Carbon Dioxide	14.[illegible]	6.[illegible]	14.31	6.06	14.31	9.59	14.31	9.55	14.31	9.53	4.47	10.23	14.47	9.63	14.47	6.37	14.47	6.13	14.47	6.13	12.16	5.52	12.25	5.[illegible]
Hydrogen	40.31	17.[illegible]	40.31	16.97	40.31	26.85	40.31	26.73	40.31	26.75	40.61	27.63	40.61	26.95	40.61	17.83	40.61	17.16	40.61	17.17	33.86	15.37	33.[illegible]	1[illegible]
Methane	24.78	10.[illegible]	24.78	10.45	24.78	16.52	24.78	16.45	24.78	16.45	24.78	17.[illegible]	24.78	16.[illegible]	24.78	10.[illegible]	24.78	10.48	24.78	10.48	20.32	9.[illegible]	20.[illegible]	[illegible]
Ethane	1.08	0.46	1.08	0.46	1.08	0.71	1.08	0.71	1.08	0.[illegible]	1.12	0.78	1.12	0.[illegible]	1.12	0.47	1.12	0.47	1.12	0.47	0.88	0.40	0.88	0.[illegible]
Propane	0.80	0.34	0.80	0.34	0.80	0.53	0.80	0.53	0.80	0.53	0.81	0.57	0.81	0.54	0.81	0.35	0.81	0.34	0.81	0.34	0.62	0.28	0.62	0.[illegible]
Butanes	0.10	0.04	0.10	0.04	0.10	0.[illegible]	0.10	0.07	0.10	0.07	0.10	0.07	0.10	0.07	0.10	0.05	0.10	0.04	0.09	0.04	0.09	0.04	0.09	0.04
Hydrogen Sulfide	2.62	1.10	2.62	1.10	2.62	1.72	2.62	1.71	2.62	1.72	2.[illegible]	1.76	2.[illegible]	1.65	2.[illegible]	1.09	2.[illegible]	1.06	2.[illegible]	1.05	1.[illegible]	0.79	1.[illegible]	0.[illegible]
Nitrogen	1.20	0.51	1.20	0.51	1.20	1.[illegible]	1.20	1.[illegible]	1.20	1.[illegible]	1.[illegible]	0.[illegible]	1.21	0.[illegible]	1.21	0.52	1.21	0.51	1.21	0.51	0.88	0.[illegible]	0.[illegible]	0.[illegible]
Helium	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.10	0.04	0.10	0.04	0.10	0.07	0.10	0.07	0.10	0.07	0.10	0.07	0.10	0.07	0.10	0.04	0.10	0.04	0.10	0.04	0.13	0.05	0.13	0.05
Benzene	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Water	---	57.73	---	57.87	---	34.58	---	33.88	---	33.88	---	29.46	---	33.[illegible]	---	56.37	---	56.71	---	57.70	---	54.60	---	55.25
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	663		755		753		662		657		[illegible]		653		650		659		762		543		547	
Reactor Pressure, psig	100		100		100		100		100		50		50		50		50		50		200		200	
Product Water Rate, lb-mol/hr	0.006699		0.006571		0.001854		0.001813		0.001788		0.001[illegible]		0.001[illegible]		0.006[illegible]		0.006[illegible]		0.006[illegible]		0.006540		0.006[illegible]	
Product Gas Rate, SCF/hr	2.3348		2.3406		2.3244		2.3164		2.3150		2.2[illegible]		2.2[illegible]		2.3038		2.3118		2.3272		2.4740		2.5[illegible]	
Product Benzene Rate, lb-mol/hr	---		---		---		---		---		---		---		---		---		---		0.000713		0.000687	
Product Gas Composition, mol %																								
Carbon Monoxide	3.72	4.13	8.30	3.99	5.05	11.66	9.54	7.30	10.52	7.94	10.41	9.45	12.[illegible]	9.[illegible]	10.42	5.42	10.54	5.24	9.93	4.71	5.76	3.00	4.61	2.[illegible]
Carbon Dioxide	18.77	8.93	19.06	9.12	16.54	14.22	18.24	13.99	17.[illegible]	14.[illegible]	16.73	13.83	16.70	12.[illegible]	17.[illegible]	8.[illegible]	17.23	8.43	17.76	8.49	20.87	10.89	21.70	11.[illegible]
Hydrogen	43.21	20.62	43.14	20.86	43.18	33.05	42.62	32.73	42.30	32.61	41.75	34.62	41.[illegible]	32.21	42.23	20.94	42.15	20.86	42.61	20.38	40.40	21.08	41.17	21.46
Methane	23.78	11.30	23.78	11.43	24.01	18.36	24.09	18.51	24.25	18.72	24.54	20.38	22.[illegible]	18.90	24.34	12.31	24.38	12.01	24.19	11.55	19.37	10.00	19.[illegible]	[illegible]
Ethane	1.10	0.52	1.06	0.52	1.08	0.76	1.09	0.[illegible]	1.08	0.[illegible]	1.11	0.92	1.11	0.[illegible]	1.07	0.54	1.10	0.54	1.10	0.54	0.81	0.42	0.81	0.42
Propane	0.80	0.37	0.82	0.37	0.69	0.53	0.81	0.59	0.80	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.40	0.[illegible]	0.39	0.[illegible]	0.38	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]
Butanes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.[illegible]
Hydrogen Sulfide	2.28	1.10	2.41	1.15	2.31	1.76	2.42	1.82	2.41	1.[illegible]	2.[illegible]	1.90	2.28	1.[illegible]	2.[illegible]	1.15	2.29	1.[illegible]	2.30	1.06	1.[illegible]	0.90	1.[illegible]	[illegible]
Nitrogen	1.22	0.56	1.09	0.52	1.10	0.82	1.18	0.91	1.21	0.91	1.21	0.92	1.21	0.[illegible]	1.20	0.[illegible]	1.21	0.59	1.20	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	[illegible]
Helium	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.[illegible]	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.[illegible]	[illegible]
Carbonyl Sulfide	0.10	0.04	0.10	0.05	0.10	0.08	0.10	0.07	0.10	0.08	0.10	0.08	0.10	0.[illegible]	0.10	0.[illegible]	0.10	0.[illegible]	0.10	0.05	0.10	0.05	0.[illegible]	[illegible]
Benzene	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Water	---	52.52	---	51.99	---	23.53	---	24.24	---	22.87	---	17.[illegible]	---	2[illegible]	---	50.42	---	50.60	---	52.26	---	57.[illegible]	---	[illegible]
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	[illegible]
CO Converted, lb-mol/hr	0.000311		0.000334		0.000103		0.000078		0.000227		0.000[illegible]		0.000161		0.000[illegible]		0.000[illegible]		0.000[illegible]		0.000790		0.000[illegible]	
CO_2 Produced, lb-mol/hr	0.000312		0.000328		0.000288		0.000261		0.000224		0.000[illegible]		0.000117		0.000[illegible]		0.000[illegible]		0.000[illegible]		0.000700		0.000[illegible]	
H_2 Produced, lb-mol/hr	0.000104		0.000[illegible]		0.000272		0.000227		0.000208		0.000[illegible]		0.000124		0.000[illegible]		0.000[illegible]		0.000[illegible]		0.000[illegible]		0.000[illegible]	
Rate of CO Conversion, 10⁶	0.31		0.33		0.30		0.23		0.23		0.1[illegible]		0.16		0.18		[illegible].20		0.23		0.[illegible]		[illegible]	

[a] Feed also contains 6.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 6.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-3, Part 4. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	37		38		39		40		41		42		43		44		45		46		47		48	
Feed Water Rate, lb-mol/hr	0.003429		0.003417		0.003393		0.007985		0.008096		0.008120		0.008135		0.003507		0.001391		0.006430		0.002450		0.006332	
Feed Gas Rate, SCF/hr	2.1939		2.1919		2.1919		2.2275		2.2275		2.2275		2.2282		2.2282		2.2298		2.2296		2.2296		2.2296	
Feed Benzene Rate, lb-mol/hr	0.000735		0.000746		0.000749		0.000656		0.000667		0.000653		0.000659		0.000676		0.000639		0.000803		0.000783		0.000791	
Feed H_2O/Gas Ratio (mol)	0.60		0.60		0.59		1.18		1.19		1.40		0.64		0.67		0.58		1.13		0.43		1.09	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %																								
Carbon Monoxide	17.19	11.20	17.15	11.23	17.15	11.23	17.16	7.66	17.13	7.91	17.17	7.59	17.16	11.55	17.11	11.32	17.22	11.27	16.90	8.56	16.84	12.27	16.83	8.57
Carbon Dioxide	12.22	7.97	12.20	7.97	12.20	8.00	12.58	5.62	12.56	5.57	12.59	5.56	12.59	8.47	12.55	8.30	12.62	8.26	12.40	6.21	12.34	8.99	12.34	6.24
Hydrogen	34.01	22.18	33.94	22.19	33.94	22.23	34.23	15.28	34.17	15.15	34.24	15.13	34.21	23.02	34.12	22.57	34.32	22.46	33.45	16.95	33.59	24.46	33.56	17.09
Methane	20.81	13.57	20.76	13.56	20.76	13.60	21.14	9.44	21.35	9.47	21.40	9.46	21.37	14.38	21.31	14.09	21.44	14.03	20.84	10.58	20.96	15.26	20.96	10.67
Ethane	0.89	0.58	0.88	0.58	0.88	0.58	0.90	0.40	0.90	0.40	0.90	0.40	0.90	0.61	0.89	0.59	0.90	0.59	0.88	0.45	0.88	0.64	0.88	0.45
Propane	0.62	0.41	0.62	0.41	0.62	0.41	0.64	0.28	0.63	0.28	0.64	0.28	0.64	0.43	0.63	0.42	0.64	0.42	0.61	0.31	0.61	0.44	0.61	0.31
Butanes	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.04	0.09	0.04	0.09	0.04	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.05	0.09	0.07	0.09	0.05
Hydrogen Sulfide	1.77	1.16	1.76	1.15	1.76	1.16	1.87	0.84	1.87	0.83	1.87	0.83	1.86	1.25	1.85	1.22	1.86	1.23	1.83	0.93	1.83	1.34	1.81	0.93
Nitrogen	0.89	0.58	0.88	0.58	0.88	0.58	0.90	0.40	0.90	0.40	0.90	0.40	0.90	0.61	0.89	0.59	0.90	0.59	0.88	0.45	0.88	0.64	0.88	0.45
Helium	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.10	0.06	0.10	0.07	0.10	0.07	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.07	0.10	0.07	0.10	0.07	0.10	0.05	0.10	0.07	0.10	0.05
Benzene	11.39	7.46	11.60	7.60	11.60	7.61	10.74	4.55	10.29	4.59	10.09	4.49	10.17	6.88	10.45	6.94	9.89	6.51	12.13	6.17	11.68	8.68	11.91	6.13
Water	---	14.26	---	14.62	---	14.46	---	55.32	---	55.31	---	54.77	---	42.66	---	43.84	---	44.46	---	49.36	---	27.13	---	49.01
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	551		659		751		652		655		742		561		642		749		563		655		748	
Reactor Pressure, psig	200		200		200		500		500		500		500		500		500		500		500		500	
Product Water Rate, lb-mol/hr	0.002327		0.002205		0.002166		0.006859		0.006883		0.007030		0.001960		0.002205		0.005291		0.001311		0.005181			
Product Gas Rate, SCF/hr	2.4472		2.4591		2.4864		2.4864		2.5457		2.5860		2.4513		2.4286		2.5081		2.5021		2.5114		2.5493	
Product Benzene Rate, lb-mol/hr	0.000650		0.000678		0.000678		0.000571		0.000582		0.000574		0.000579		0.000604		0.000574		0.000739		0.000715		0.000726	
Product Gas Composition, mol %																								
Carbon Monoxide	6.63	4.97	6.78	4.40	7.15	4.20	5.13	2.60	3.95	1.97	5.22	1.65	6.20	4.84	4.57	3.50	4.31	3.30	5.41	3.12	4.15	3.51	3.61	2.12
Carbon Dioxide	20.50	15.37	20.97	15.98	20.40	16.40	21.76	11.02	22.79	11.65	23.25	11.83	20.75	16.28	22.14	16.94	22.45	17.16	21.15	14.22	22.07	19.69	22.44	15.16
Hydrogen	40.47	30.21	40.50	31.86	40.07	31.64	41.44	21.00	41.91	21.42	42.45	21.48	40.49	31.77	41.27	31.57	41.87	31.86	40.47	23.14	40.83	34.57	41.09	24.09
Methane	19.49	14.62	19.34	14.74	19.09	14.90	19.37	9.81	19.48	9.90	19.23	9.75	19.53	15.12	19.58	14.97	19.56	14.95	19.19	11.07	19.11	16.18	19.05	11.20
Ethane	0.82	0.61	0.81	0.62	0.81	0.61	0.82	0.42	0.82	0.42	0.82	0.42	0.82	0.64	0.82	0.63	0.82	0.63	0.80	0.46	0.79	0.62	0.80	0.47
Propane	0.53	0.40	0.55	0.42	0.53	0.42	0.55	0.28	0.56	0.28	0.55	0.28	0.57	0.44	0.56	0.43	0.54	0.42	0.54	0.31	0.54	0.46	0.53	0.31
Butanes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.53	1.15	1.51	1.15	1.51	1.15	1.66	0.84	1.60	0.82	1.64	0.83	1.64	1.27	1.66	1.26	1.65	1.25	1.61	0.92	1.45	1.32	1.62	0.94
Nitrogen	0.82	0.61	0.81	0.62	0.81	0.61	0.82	0.42	0.82	0.42	0.82	0.42	0.82	0.64	0.82	0.65	0.82	0.63	0.80	0.46	0.79	0.62	0.80	0.47
Helium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.10	0.07	0.10	0.08	0.10	0.08	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.08	0.10	0.08	0.10	0.08	0.10	0.06	0.10	0.08	0.10	0.06
Benzene	9.36	6.98	9.62	7.33	9.50	7.42	8.29	4.15	8.10	4.14	7.98	4.03	8.00	6.64	8.12	6.48	8.07	6.43	9.88	5.67	10.05	8.37	9.92	5.80
Water	---	25.00	---	24.79	---	22.56	---	49.40	---	48.72	---	49.29	---	22.04	---	23.53	---	23.66	---	42.36	---	16.47	---	42.36
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000642		0.000697		0.000750		0.000744		0.000828		0.000972		0.000685		0.000758		0.000705		0.000713		0.000660		0.000682	
CO_2 Produced, lb-mol/hr	0.000645		0.000695		0.000747		0.000720		0.000827		0.000974		0.000682		0.000777		0.000716		0.000746		0.000657			
H_2 Produced, lb-mol/hr	0.000627		0.000673		0.000737		0.000713		0.000810		0.000959		0.000664		0.000739		0.000717		0.000717		0.000614			
Rate of CO Conversion, 10^4	0.64		0.70		0.75		0.74		0.83		0.97		0.69		0.78		0.72		0.71		0.64			

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 5. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	47 Dry	47 Wet	50 Dry	50 Wet	51 Dry	51 Wet
Feed Water Rate, lb-mol/hr	[illegible]		0.006675		0.006124	
Feed Gas Rate, SCF/hr	2.1925		2.1925		2.1925	
Feed Benzene Rate, lb-mol/hr	0.000724		0.000724		0.000715	
Feed H_2O/Gas Ratio (mol)						
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %						
Carbon Monoxide	17.21	8.92	17.21	8.65	17.23	[illegible]
Carbon Dioxide	12.24	6.27	12.24	6.19	12.25	6.26
Hydrogen	34.07	17.47	34.07	17.11	34.12	[illegible]
Methane	20.84	10.68	20.84	10.48	20.67	10.67
Ethane	0.89	0.46	0.89	0.45	0.89	[illegible]
Propane	0.62	0.32	0.62	0.31	0.62	[illegible]
Butane	0.09	0.05	0.09	0.05	0.09	[illegible]
Hydrogen Sulfide	1.77	0.91	1.77	0.89	1.77	[illegible]
Nitrogen	0.89	0.46	0.89	0.45	0.89	[illegible]
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.10	0.05	0.1	0.05	0.10	[illegible]
Phenol	--	--	--	--	--	--
Benzene	11.27	5.74	11.27	5.67	11.16	5.71
Water	--	48.71	--	49.71	--	[illegible]
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	550	--	652	--	750	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.004887	--	0.004752	--	0.004336	--
Product Gas Rate, SCF/hr	2.4485	--	2.4848	--	2.4940	--
Product Benzene Rate, lb-mol/hr	0.000574	--	0.000633	--	0.000670	--
Product Gas Composition, mol %						
Carbon Monoxide	6.23	4.66	5.01	3.00	4.62	[illegible]
Carbon Dioxide	20.99	12.31	21.[illegible]	13.03	21.93	12.91
Hydrogen	41.00	24.05	41.35	24.75	41.23	[illegible]
Methane	19.63	11.51	19.31	11.44	19.32	11.32
Ethane	0.82	0.48	0.83	0.49	0.81	[illegible]
Propane	0.56	0.33	0.55	[illegible]	0.55	[illegible]
Butane	0.00	0.00	0.03	[illegible]	0.08	[illegible]
Hydrogen Sulfide	1.53	0.91	1.54	[illegible]	1.52	[illegible]
Nitrogen	0.82	0.44	0.82	[illegible]	0.81	[illegible]
Helium	0.01	0.01	0.01	0.01	0.01	[illegible]
Carbonyl Sulfide	0.10	0.05	0.10	0.05	0.10	[illegible]
Phenol	--	--	--	--	--	--
Benzene	8.31	4.86	8.42	5.35	9.40	[illegible]
Water	--	41.33	--	40.13	--	40.81
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000672	--	0.000741	--	0.000774	--
CO_2 Produced, lb-mol/hr	0.000670	--	0.000757	--	0.000775	--
H_2 Produced, lb-mol/hr	0.000656	--	0.000743	--	0.000760	--
Rate of CO Conversion X 10^{-4}, lb-mol/hr g catalyst	0.67	--	0.75	--	0.77	--

Run No.	52 Dry	52 Wet	53 Dry	53 Wet	54 Dry	54 Wet	55 Dry	55 Wet
Feed Water Rate, lb-mol/hr	[illegible]		[illegible]		0.003086		0.008010	
Feed Gas Rate, SCF/hr	2.2215		2.2215		2.2215		2.2193	
Feed Benzene Rate, lb-mol/hr	[illegible]		0.000695		0.000678		0.000709	
Feed H_2O/Gas Ratio (mol)								
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %								
Carbon Monoxide	17.20	[illegible]	17.48	12.07	17.42	11.86	17.81	7.95
Carbon Dioxide	12.50	[illegible]	12.58	[illegible]	12.52	8.53	12.02	5.37
Hydrogen	[illegible]	15.51	33.08	23.51	34.51	23.10	34.28	15.32
Methane	20.57	[illegible]	20.71	14.24	20.66	10.89	20.58	9.19
Ethane	[illegible]	0.41	0.90	0.62	0.90	0.61	0.90	0.40
Propane	0.62	[illegible]	0.62	[illegible]	0.62	0.42	0.62	0.28
Butane	0.09	0.04	0.09	0.06	0.09	0.06	0.09	0.04
Hydrogen Sulfide	1.78	[illegible]	1.79	1.24	1.78	1.22	1.77	0.80
Nitrogen	0.89	[illegible]	0.90	0.62	0.90	0.61	0.90	0.40
Helium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	0.09	[illegible]	0.09	0.04
Phenol	--	--	--	--	--	--	--	--
Benzene	11.40	[illegible]	10.75	[illegible]	10.50	7.21	10.33	4.90
Water	--	51.17	--	[illegible]	--	[illegible]	--	55.30
Total	100.00	[illegible]	100.00	[illegible]	100.06	100.00	100.00	100.00
Reactor Temperature, °F	654	--	[illegible]	--	750	--	653	--
Reactor Pressure, psig	100	--	[illegible]	--	100	--	50	--
Product Water Rate, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
Product Gas Rate, SCF/hr	[illegible]	--	2.3019	--	[illegible]	--	[illegible]	--
Product Benzene Rate, lb-mol/hr	0.000670	--	0.000630	--	[illegible]	--	[illegible]	--
Product Gas Composition, mol %								
Carbon Monoxide	10.05	[illegible]	11.15	[illegible]	[illegible]	[illegible]	12.69	6.17
Carbon Dioxide	14.19	[illegible]	17.53	[illegible]	25.38	14.11	16.04	7.92
Hydrogen	34.34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37.21	14.15
Methane	19.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.78
Ethane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.86	0.42
Propane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.60	0.29
Butane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hydrogen Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.78
Nitrogen	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.42
Helium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01
Carbonyl Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.04
Phenol	--	--	--	--	--	--	--	--
Benzene	[illegible]	5.03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.78
Water	--	[illegible]	--	20.92	--	[illegible]	--	51.72
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100.00
CO Converted, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
CO_2 Produced, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
H_2 Produced, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	0.000281	--
Rate of CO Conversion X 10^{-4}, lb-mol/hr g catalyst	0.44	--	[illegible]	--	[illegible]	--	0.40	--

Run No.	56 Dry	56 Wet	57 Dry	57 Wet	58 Dry	58 Wet	59 Dry	59 Wet	60 Dry	60 Wet
Feed Water Rate, lb-mol/hr	[illegible]		0.003343		[illegible]		[illegible]		[illegible]	
Feed Gas Rate, SCF/hr	2.2193		2.2193		[illegible]		[illegible]		2.2197	
Feed Benzene Rate, lb-mol/hr	0.000729		[illegible]		[illegible]		[illegible]		[illegible]	
Feed H_2O/Gas Ratio (mol)										
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %										
Carbon Monoxide	17.77	8.08	[illegible]	11.68	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Carbon Dioxide	11.98	5.46	11.91	[illegible]	[illegible]	[illegible]	13.34	6.50	12.94	5.75
Hydrogen	34.20	15.56	34.12	22.49	[illegible]	22.08	[illegible]	16.85	33.76	[illegible]
Methane	29.52	9.34	29.45	13.50	[illegible]	[illegible]	[illegible]	9.69	[illegible]	[illegible]
Ethane	0.90	0.41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Propane	0.62	0.28	0.62	0.40	0.62	0.41	0.62	0.31	0.62	[illegible]
Butane	0.09	0.04	[illegible]	0.06	[illegible]	[illegible]	[illegible]	0.05	[illegible]	0.04
Hydrogen Sulfide	1.76	0.81	[illegible]	1.17	[illegible]	1.17	1.79	0.89	1.79	0.79
Nitrogen	0.90	0.41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Helium	0.01	0.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01	0.01
Carbonyl Sulfide	0.09	0.04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Phenol	--	--	--	--	--	--	--	--	--	--
Benzene	11.16	5.11	11.48	7.66	[illegible]	[illegible]	10.74	5.41	10.55	4.51
Water	--	54.45	--	[illegible]	--	34.48	--	[illegible]	--	[illegible]
Total	100.00	100.00	100.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100.00	100.00
Reactor Temperature, °F	746	--	[illegible]	--	552	--	552	--	650	--
Reactor Pressure, psig	50	--	50	--	[illegible]	--	[illegible]	--	[illegible]	--
Product Water Rate, lb-mol/hr	0.006924	--	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
Product Gas Rate, SCF/hr	2.3438	--	2.3178	--	2.3425	--	2.5121	--	[illegible]	--
Product Benzene Rate, lb-mol/hr	0.000676	--	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
Product Gas Composition, mol %										
Carbon Monoxide	12.96	5.97	13.15	[illegible]	5.63	[illegible]	5.28	[illegible]	[illegible]	[illegible]
Carbon Dioxide	16.42	[illegible]	15.46	11.66	[illegible]	[illegible]	[illegible]	[illegible]	24.17	[illegible]
Hydrogen	37.63	[illegible]	36.64	[illegible]	[illegible]	[illegible]	[illegible]	24.18	42.13	[illegible]
Methane	19.91	[illegible]	19.93	[illegible]	[illegible]	13.45	[illegible]	[illegible]	17.17	[illegible]
Ethane	[illegible]	0.42	[illegible]	[illegible]	[illegible]	0.56	0.72	[illegible]	0.70	[illegible]
Propane	[illegible]	[illegible]	0.59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.54	[illegible]
Butane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hydrogen Sulfide	1.61	[illegible]	1.60	1.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nitrogen	0.86	0.42	0.86	[illegible]	[illegible]	[illegible]	[illegible]	0.52	[illegible]	0.44
Helium	[illegible]	[illegible]	0.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01	[illegible]
Carbonyl Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Phenol	--	--	--	--	--	--	--	--	--	--
Benzene	[illegible]	4.94	10.81	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.29	4.20
Water	--	[illegible]	--	24.90	--	[illegible]	--	41.61	--	[illegible]
Total	[illegible]	[illegible]	100.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CO Converted, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
CO_2 Produced, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
H_2 Produced, lb-mol/hr	[illegible]	--	0.000241	--	[illegible]	--	[illegible]	--	[illegible]	--
Rate of CO Conversion X 10^{-4}, lb-mol/hr g catalyst	0.34	--	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--

Feed also contains 4.1 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 1.6 ppm isopropyl mercaptan, and 2.1 ppm disulfides.

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Table B-3, Part 6. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	61		62		63		64		65		66		67		68		69		70		71		72	
Feed Water Rate, lb-mol/hr	0.008161		0.003184		0.003187		0.003307		0.006161		0.006197		0.003393		0.003282		0.003393		0.006197		0.006124		0.006124	
Feed Gas Rate, SCF/hr	2.2137		2.2214		2.2214		2.2214		2.2119		2.2119		2.2113		2.2113		2.2113		2.2227		2.2227		2.2227	
Feed Benzene Rate, lb-mol/hr	0.000712		0.000678		0.000686		0.000678		0.000726		0.000709		0.000698		0.000678		0.000602		0.000678		0.000690		0.000678	
Feed H_2O/Gas Ratio (mol)																								
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %																								
Carbon Monoxide	18.80	8.35	19.01	12.72	19.04	12.59	19.01	12.56	19.96	9.66	19.00	8.65	19.04	12.47	19.19	12.83	19.33	12.80	19.19	9.74	19.07	9.79	19.11	9.80
Carbon Dioxide	12.49	5.71	13.00	8.69	13.02	8.60	13.00	8.58	12.89	6.26	12.89	5.63	12.84	8.41	12.88	8.52	13.04	8.50	12.63	6.57	12.86	6.60	12.89	6.61
Hydrogen	33.61	14.61	33.66	22.55	33.73	22.34	33.66	22.27	33.44	17.13	33.49	17.13	33.69	22.06	33.79	22.36	34.20	22.26	33.81	17.24	33.75	17.32	33.81	17.34
Methane	19.25	8.51	19.36	12.97	19.31	12.64	19.36	12.51	19.22	9.63	19.22	9.80	19.21	12.58	19.27	12.75	19.50	12.71	19.24	9.81	19.24	9.84	19.24	9.89
Ethane	0.80	0.35	0.81	0.54	0.82	0.53	0.81	0.53	0.80	0.41	0.80	0.41	0.81	0.53	0.81	0.54	0.82	0.53	0.81	0.41	0.80	0.41	0.81	0.41
Propane	0.62	0.28	0.62	0.41	0.62	0.40	0.62	0.40	0.63	0.32	0.63	0.32	0.64	0.42	0.64	0.42	0.65	0.42	0.62	0.32	0.64	0.42	0.62	0.32
Butane	0.09	0.04	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.05	0.09	0.05	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.05	0.09	0.05	0.09	0.05
Hydrogen Sulfide	1.76	0.76	1.79	1.19	1.81	1.18	1.79	1.18	1.78	0.91	1.78	0.91	1.79	1.18	1.81	1.18	1.81	1.18	1.78	0.91	1.78	0.91	1.78	0.91
Nitrogen	0.36	0.43	0.94	0.65	0.94	0.65	0.94	0.65	0.97	0.50	0.97	0.50	0.98	0.64	0.98	0.65	1.00	0.65	0.98	0.50	0.96	0.50	0.96	0.49
Helium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.01	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.04	0.09	0.04	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.05	0.09	0.05	0.09	0.05
Phenol	--	--	--	--	--	--	--	--	--	--	--	--	0.20	0.13	0.20	0.14	0.17	0.11	0.20	0.10	0.20	0.10	0.20	0.10
Benzene	10.93	4.96	11.58	7.94	10.91	7.34	11.58	8.00	11.22	5.75	11.13	5.52	10.62	6.95	10.35	6.86	9.19	6.06	10.34	5.26	10.51	5.38	10.33	5.29
Water	--	55.83	--	33.11	--	39.99	--	43.41	--	46.12	--	49.03	--	33.51	--	33.84	--	41.43	--	49.01	--	46.69	--	48.73
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	749	--	661	--	663	--	752	--	655	--	753	--	755	--	655	--	747	--	657	--	653	--	746	--
Reactor Pressure, psig	1000	--	1000	--	1000	--	1000	--	1000	--	1000	--	1000	--	1000	--	1000	--	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.006957	--	0.002054	--	0.002254	--	0.002204	--	0.005122	--	0.004436	--	0.002230	--	0.002107	--	0.002192	--	0.005024	--	0.004900	--	0.004801	--
Product Gas Rate, SCF/hr	2.6104	--	2.5475	--	2.5461	--	2.5459	--	2.5512	--	2.562	--	2.5284	--	2.5672	--	2.5652	--	2.5511	--	2.5905	--	2.6003	--
Product Benzene Rate, lb-mol/hr	0.000655	--	0.000611	--	0.000602	--	0.000639	--	0.000653	--	0.000653	--	0.000638	--	0.000611	--	0.000543	--	0.000602	--	0.000600	--	0.000600	--
Product Gas Composition, mol %																								
Carbon Monoxide	2.83	1.46	5.17	4.26	3.39	2.45	3.64	2.45	3.87	2.06	3.10	1.97	5.63	4.27	4.06	3.15	3.27	3.27	5.32	3.11	3.73	2.21	3.40	2.32
Carbon Dioxide	24.91	12.46	23.12	18.00	24.32	18.54	24.31	18.54	23.32	13.3	23.52	12.4	22.92	17.39	23.15	14.73	24.27	18.41	23.24	13.73	26.44	14.04	24.62	14.89
Hydrogen	42.60	22.92	41.62	31.59	42.35	32.18	42.32	32.56	42.23	23.4	42.45	23.15	41.36	31.19	42.38	32.46	42.74	32.74	42.26	23.52	41.64	23.54	42.78	23.88
Methane	17.02	8.79	17.55	13.65	17.32	13.23	17.22	13.25	17.11	9.12	17.10	10.22	17.44	13.23	17.24	13.37	17.44	13.37	17.22	10.11	18.39	9.25	17.04	10.39
Ethane	0.70	0.36	0.72	0.56	0.71	0.54	0.71	0.54	0.71	0.42	0.71	0.42	0.71	0.54	0.72	0.55	0.72	0.55	0.72	0.43	0.71	0.43	0.71	0.43
Propane	0.55	0.28	0.57	0.44	0.56	0.43	0.56	0.43	0.56	0.32	0.56	0.32	0.57	0.43	0.55	0.42	0.56	0.43	0.55	0.33	0.56	0.33	0.54	0.33
Butane	0.08	0.04	0.08	0.06	0.08	0.06	0.08	0.06	0.08	0.04	0.08	0.04	0.08	0.06	0.08	0.06	0.08	0.06	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	1.51	0.79	1.58	1.23	1.54	1.16	1.53	1.18	1.53	0.91	1.53	0.91	1.58	1.20	1.57	1.22	1.57	1.20	1.57	0.92	1.54	0.93	1.54	0.93
Nitrogen	0.85	0.44	0.88	0.64	0.86	0.66	0.87	0.66	0.87	0.52	0.86	0.51	0.89	0.68	0.88	0.64	0.89	0.68	0.86	0.51	0.87	0.50	0.87	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.05	0.09	0.07	0.09	0.07	0.09	0.07	0.09	0.05	0.09	0.05	0.09	0.07	0.09	0.07	0.09	0.07	0.10	0.06	0.10	0.06	0.10	0.06
Phenol	--	--	--	--	--	--	--	--	--	--	--	--	0.14	0.14	0.14	0.13	0.15	0.12	0.15	0.11	0.15	0.11	0.15	0.11
Benzene	8.91	4.85	8.39	6.60	8.34	6.29	8.66	6.66	8.34	5.31	8.37	5.31	8.62	6.81	8.17	6.81	7.24	5.66	8.17	4.84	8.14	4.93	8.07	4.96
Water	--	48.39	--	22.22	--	23.63	--	23.43	--	40.51	--	39.24	--	24.35	--	22.40	--	23.29	--	32.09	--	33.12	--	30.46
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.001014	--	0.000611	--	0.000340	--	0.000367	--	0.000765	--	0.001177	--	0.000821	--	0.000911	--	0.000419	--	0.000445	--	0.000459	--	0.000975	--
CO_2 Produced, lb-mol/hr	0.001014	--	0.000625	--	0.000342	--	0.000362	--	0.000765	--	0.001177	--	0.000821	--	0.000926	--	0.000915	--	0.000849	--	0.000957	--	0.000976	--
H_2 Produced, lb-mol/hr	0.000997	--	0.000792	--	0.000726	--	0.000947	--	0.000945	--	0.001451	--	0.000805	--	0.000910	--	0.000832	--	0.000853	--	0.000933	--	0.000961	--
Rate of CO Conversion X 10^4 lb-mol/hr-g Catalyst	1.01	--	0.61	--	0.34	--	0.36	--	0.77	--	0.78	--	0.82	--	0.91	--	0.42	--	0.45	--	0.46	--	0.98	--

Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-3, Part 7. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	73		74		75		76	
Feed Water Rate, lb-mol/hr	0.009292		0.008331		0.008404		0.009059	
Feed Gas Rate, SCF/hr	2.2147		2.2147		2.2117		2.2201	
Feed Benzene Rate, lb-mol/hr	0.000664		0.000644		0.000706		0.000794	
Feed H_2O/Gas Ratio (mol)								
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %								
Carbon Monoxide	19.14	8.16	[illegible]	8.31	19.02	[illegible]	17.66	7.32
Carbon Dioxide	12.[illegible]	5.04	12.85	5.41	12.44	[illegible]	[illegible]	[illegible]
Hydrogen	33.[illegible]	14.79	33.29	14.71	33.68	14.7[illegible]	[illegible]	15.11
Methane	19.31	8.43	19.21	8.[illegible]	19.20	[illegible]	19.[illegible]	[illegible]
Ethane	[illegible]	0.35	0.82	[illegible]	0.80	[illegible]	0.79	[illegible]
Propane	0.[illegible]	0.29	0.63	0.25	[illegible]	[illegible]	[illegible]	[illegible]
Butane	[illegible]	0.04	[illegible]	[illegible]	0.0[illegible]	[illegible]	[illegible]	[illegible]
Hydrogen Sulfide	1.7[illegible]	0.78	1.74	0.78	1.78	[illegible]	1.85	[illegible]
Nitrogen	0.9[illegible]	0.43	[illegible]	0.43	0.98	[illegible]	0.95	0.43
Helium	0.01	0.01	0.01	0.01	0.01	[illegible]	0.01	0.01
Carbonyl Sulfide	[illegible]	0.03	[illegible]	0.01	0.09	[illegible]	0.09	[illegible]
Phenol	0.19	0.04	0.20	[illegible]	0.20	[illegible]	[illegible]	[illegible]
Benzene	10.15	4.43	10.62	4.65	10.68	[illegible]	[illegible]	[illegible]
Water	--	56.34	--	56.34	--	[illegible]	--	55.11
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	561	--	[illegible]	--	750	--	551	--
Reactor Pressure, psig	1000	--	1000	--	1000	--	[illegible]	--
Product Water Rate, lb-mol/hr	0.007[illegible]	--	0.007110	--	[illegible]	--	[illegible]	--
Product Gas Rate, SCF/hr	2.5[illegible]	--	2.6[illegible]	--	[illegible]	--	2.520[illegible]	--
Product Benzene Rate, lb-mol/hr	0.000600	--	[illegible]	--	0.000627	--	[illegible]	--
Product Gas Composition, mol %								
Carbon Monoxide	4.[illegible]	2.46	5.15	[illegible]	3.00	[illegible]	[illegible]	[illegible]
Carbon Dioxide	23.[illegible]	11.65	24.73	12.55	24.86	[illegible]	21.55	[illegible]
Hydrogen	42.0[illegible]	21.09	42.73	21.74	42.69	[illegible]	[illegible]	[illegible]
Methane	17.41	8.74	15.31	7.83	17.04	[illegible]	[illegible]	[illegible]
Ethane	0.72	0.36	[illegible]	0.36	0.70	[illegible]	0.72	[illegible]
Propane	0.56	0.28	0.55	0.28	0.54	[illegible]	0.55	0.28
Butane	0.00	0.00	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]
Hydrogen Sulfide	1.56	0.78	1.53	0.78	1.54	[illegible]	1.64	[illegible]
Nitrogen	0.8[illegible]	0.44	0.84	0.43	0.87	[illegible]	[illegible]	0.43
Helium	0.01	0.01	0.01	0.01	0.01	0.01	[illegible]	0.01
Carbonyl Sulfide	0.10	0.05	0.09	0.04	0.0[illegible]	0.03	[illegible]	[illegible]
Phenol	0.17	0.08	1.76	0.89	0.18	[illegible]	0.21	0.11
Benzene	8.2[illegible]	4.10	8.52	4.33	8.26	4.27	9.48	4.3[illegible]
Water	--	49.76	--	49.13	--	[illegible]	--	49.6[illegible]
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000476	--	0.000397	--	0.001008	--	0.000775	--
CO_2 Produced, lb-mol/hr	0.000473	--	0.000398	--	0.001008	--	0.000772	--
H_2 Produced, lb-mol/hr	0.000859	--	0.000982	--	0.000912	--	0.000761	--
Rate of CO Conversion X 10^4, lb-mol/hr-g Catalyst	0.88	--	1.0	--	1.91	--	0.74	--

Run No.	77		78		79		80	
Feed Water Rate, lb-mol/hr	0.007630		0.008169		0.008353		0.008341	
Feed Gas Rate, SCF/hr	2.2201		2.2201		2.2226		2.2226	
Feed Benzene Rate, lb-mol/hr	0.000688		0.000678		0.000678		0.000687	
Feed H_2O/Gas Ratio (mol)								
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %								
Carbon Monoxide	17.45	8.22	17.97	7.93	19.20	8.36	19.24	[illegible]
Carbon Dioxide	12.43	5.7[illegible]	12.45	5.49	12.58	5.48	12.62	5.50
Hydrogen	34.24	15.6[illegible]	34.25	15.11	32.37	14.10	32.41	14.12
Methane	20.23	[illegible]	20.25	8.93	20.82	9.08	20.92	9.10
Ethane	[illegible]	[illegible]	0.41	0.16	0.81	0.35	0.81	0.35
Propane	0.62	[illegible]	0.62	0.27	0.64	0.28	0.64	0.28
Butane	[illegible]	[illegible]	0.09	0.04	0.09	0.04	0.09	0.04
Hydrogen Sulfide	1.88	[illegible]	1.66	0.75	1.89	0.82	1.8[illegible]	0.82
Nitrogen	0.94	[illegible]	0.99	0.44	0.99	0.43	[illegible]	0.43
Helium	[illegible]	[illegible]	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	[illegible]	[illegible]	0.0[illegible]	0.04	0.09	0.04	0.09	0.04
Phenol	0.20	[illegible]	0.2[illegible]	0.09	0.20	0.09	0.20	0.09
Benzene	10.48	4.7[illegible]	10.[illegible]	4.[illegible]	10.31	4.49	[illegible]	4.50
Water	--	54.21	--	55.[illegible]	--	56.43	--	56.34
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	651	--	7[illegible]	--	55[illegible]	--	650	--
Reactor Pressure, psig	500	--	500	--	20[illegible]	--	20[illegible]	--
Product Water Rate, lb-mol/hr	0.006155	--	[illegible]	--	[illegible]	--	0.007234	--
Product Gas Rate, SCF/hr	2.5[illegible]	--	[illegible]	--	[illegible]	--	2.55[illegible]	--
Product Benzene Rate, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
Product Gas Composition, mol %								
Carbon Monoxide	4.14	[illegible]	[illegible]	[illegible]	[illegible]	3.[illegible]	[illegible]	2.5[illegible]
Carbon Dioxide	21.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11.10	22.[illegible]	[illegible]
Hydrogen	[illegible]	22.[illegible]	42.[illegible]	[illegible]	[illegible]	14.95	[illegible]	[illegible]
Methane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.58	[illegible]	[illegible]
Ethane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.3[illegible]	[illegible]	[illegible]
Propane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.28	0.55	[illegible]
Butane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hydrogen Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.84	[illegible]	[illegible]
Nitrogen	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.88	0.44
Helium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Carbonyl Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Phenol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Benzene	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.2[illegible]	[illegible]	4.[illegible]
Water	--	[illegible]	--	[illegible]	--	48.9[illegible]	--	[illegible]
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000456	--	[illegible]	--	[illegible]	--	[illegible]	--
CO_2 Produced, lb-mol/hr	0.000458	--	[illegible]	--	[illegible]	--	[illegible]	--
H_2 Produced, lb-mol/hr	[illegible]	--	[illegible]	--	[illegible]	--	[illegible]	--
Rate of CO Conversion X 10^4, lb-mol/hr-g Catalyst	0.85	--	[illegible]	--	[illegible]	--	0.52	--

Run No.	81		82		83		81	
Feed Water Rate, lb-mol/hr	0.008169		0.008353		[illegible]		[illegible]	
Feed Gas Rate, SCF/hr	2.2226		2.2192		2.2147		2.22[illegible]	
Feed Benzene Rate, lb-mol/hr	0.000865		[illegible]		[illegible]		0.000674	
Feed H_2O/Gas Ratio (mol)								
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %								
Carbon Monoxide	15.65	[illegible]	16.55	[illegible]	14.64	8.22	15.51	[illegible]
Carbon Dioxide	12.22	5.44	12.20	[illegible]	12.[illegible]	[illegible]	12.14	[illegible]
Hydrogen	31.47	14.10	[illegible]	14.57	34.24	15.11	34.05	[illegible]
Methane	20.25	[illegible]	[illegible]	9.5[illegible]	19.69	[illegible]	[illegible]	8.6[illegible]
Ethane	0.78	0.3[illegible]	[illegible]	[illegible]	0.80	0.36	0.81	[illegible]
Propane	0.62	0.28	0.62	0.27	0.62	0.27	0.62	0.28
Butane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.09	[illegible]
Hydrogen Sulfide	1.83	0.82	1.[illegible]	0.85	1.98	0.87	1.97	[illegible]
Nitrogen	[illegible]	0.43	[illegible]	[illegible]	1.00	0.44	[illegible]	[illegible]
Helium	[illegible]	[illegible]	[illegible]	[illegible]	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.14	0.04	[illegible]	[illegible]	0.1[illegible]	0.04	[illegible]	0.04
Phenol	0.24	0.11	0.20	[illegible]	0.20	0.08	0.20	[illegible]
Benzene	12.78	5.73	[illegible]	4.69	10.31	4.50	10.30	4.5[illegible]
Water	--	55.17	--	56.1[illegible]	--	55.99	--	55.46
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	750	--	55[illegible]	--	652	--	552	--
Reactor Pressure, psig	200	--	100	--	105	--	55	--
Product Water Rate, lb-mol/hr	0.006691	--	[illegible]	--	0.005420	--	0.006675	--
Product Gas Rate, SCF/hr	2.560[illegible]	--	2.3677	--	2.390[illegible]	--	2.3306	--
Product Benzene Rate, lb-mol/hr	0.000511	--	[illegible]	--	[illegible]	--	0.000416	--
Product Gas Composition, mol %								
Carbon Monoxide	[illegible]	[illegible]	12.[illegible]	6.15	11.16	5.53	14.06	7.02
Carbon Dioxide	22.66	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15.90	[illegible]
Hydrogen	[illegible]	20.[illegible]	[illegible]	20.3[illegible]	[illegible]	16.25	36.95	18.4[illegible]
Methane	[illegible]	[illegible]	[illegible]	[illegible]	14.02	7.37	13.53	[illegible]
Ethane	[illegible]	[illegible]	[illegible]	[illegible]	0.7[illegible]	[illegible]	0.78	[illegible]
Propane	0.54	[illegible]	[illegible]	[illegible]	0.5[illegible]	0.2[illegible]	0.60	0.3[illegible]
Butane	[illegible]	[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00
Hydrogen Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	1.81	0.91	1.88	0.94
Nitrogen	[illegible]	[illegible]	[illegible]	[illegible]	0.94	0.47	0.87	0.44
Helium	[illegible]	0.01	[illegible]	[illegible]	0.01	0.01	0.01	0.01
Carbonyl Sulfide	[illegible]	[illegible]	[illegible]	[illegible]	0.11	0.0[illegible]	0.1[illegible]	0.05
Phenol	[illegible]	[illegible]	[illegible]	0.30	0.15	0.09	0.20	0.10
Benzene	[illegible]	5.[illegible]	[illegible]	4.[illegible]	8.55	4.27	9.05	4.55
Water	--	[illegible]	--	47.19	--	50.42	--	50.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	[illegible]	--	[illegible]	--	0.000443	--	0.000284	--
CO_2 Produced, lb-mol/hr	[illegible]	--	[illegible]	--	0.000443	--	0.000282	--
H_2 Produced, lb-mol/hr	[illegible]	--	[illegible]	--	0.000126	--	0.000264	--
Rate of CO Conversion X 10^4, lb-mol/hr-g Catalyst	0.88	--	[illegible]	--	0.44	--	0.25	--

Feed also contains 3.1 ppm ethyl mercaptan, 1.1 ppm, n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

D-F-1-23-12[illegible]

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Table B-3, Part 8. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	85		86		87	
Feed Water Rate, lb-mol/hr	0.008047		0.008132		0.008206	
Feed Gas Rate, SCF/hr	2.2232		2.2263		2.2263	
Feed Benzene Rate, lb-mol/hr	0.000613		0.000689		0.000667	
Feed H_2O/Gas Ratio (mol)	1.27		1.27		1.28	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*	--	--	--	--	--	--
Carbon Monoxide	19.18	8.45	18.33	8.12	18.39	8.08
Carbon Dioxide	12.26	5.43	12.87	5.70	12.93	5.67
Hydrogen	34.39	15.22	34.22	15.15	34.29	15.06
Methane	20.11	8.90	19.48	8.63	19.56	8.57
Ethane	0.81	0.36	0.80	0.36	0.80	0.35
Propane	0.63	0.28	0.62	0.27	0.62	0.26
Butanes	0.09	0.04	0.09	0.04	0.09	0.04
Hydrogen Sulfide	1.99	0.88	1.79	0.79	1.79	0.78
Nitrogen	0.91	0.40	1.07	0.47	1.07	0.46
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.04	0.09	0.04	0.09	0.04
Phenol	0.17	0.08	0.36	0.16	0.36	0.16
Benzene	9.44	4.17	10.27	4.56	10.00	4.39
Water	--	55.74	--	55.70	--	56.13
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	654	--	551	--	650	--
Reactor Pressure, psig	50	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.006773	--	0.006810	--	0.006981	--
Product Gas Rate, SCF/hr	2.3411	--	2.5444	--	2.5832	--
Product Benzene Rate, lb-mol/hr	0.000537	--	0.000600	--	0.000611	--
Product Gas Composition, mol %	--	--	--	--	--	--
Carbon Monoxide	13.84	6.83	5.08	2.61	3.56	1.82
Carbon Dioxide	16.47	8.13	23.01	11.82	24.06	12.31
Hydrogen	37.61	18.58	41.76	21.57	42.52	22.03
Methane	19.69	9.73	17.78	9.13	17.49	8.95
Ethane	0.79	0.39	0.72	0.37	0.71	0.36
Propane	0.61	0.30	0.56	0.29	0.55	0.28
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.89	0.93	1.59	0.81	1.56	0.80
Nitrogen	0.88	0.43	0.96	0.49	0.95	0.48
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.11	0.05	0.10	0.05	0.10	0.05
Phenol	0.17	0.08	0.32	0.16	0.30	0.15
Benzene	7.93	3.95	8.11	4.17	8.19	4.17
Water	--	50.59	--	48.52	--	48.59
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000306	--	0.000820	--	0.000925	--
CO_2 Produced, lb-mol/hr	0.000305	--	0.000822	--	0.000925	--
H_2 Produced, lb-mol/hr	0.000289	--	0.000806	--	0.000433	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.31	--	0.82	--	0.93	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 9. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	88		89		90	
Feed Water Rate, lb-mol/hr	0.008279		0.003368		0.003460	
Feed Gas Rate, SCF/hr	2.2263		2.2251		2.2251	
Feed Benzene Rate, lb-mol/hr	0.000574		0.000670		0.000673	
Feed H_2O/Gas Ratio (mol)	1.29		0.52		0.54	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.65	8.10	18.39	12.06	18.39	11.94
Carbon Dioxide	13.09	5.69	12.93	8.48	12.93	8.39
Hydrogen	34.81	15.11	34.29	22.55	34.29	22.41
Methane	19.81	8.60	19.56	12.83	19.56	12.70
Ethane	0.82	0.36	0.80	0.52	0.80	0.52
Propane	0.63	0.27	0.62	0.40	0.62	0.40
Butanes	0.09	0.04	0.09	0.06	0.09	0.06
Hydrogen Sulfide	1.83	0.79	1.79	1.18	1.79	1.17
Nitrogen	1.09	0.47	1.07	0.70	1.07	0.70
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.04	0.09	0.06	0.09	0.06
Phenol	0.31	0.14	0.36	0.23	0.36	0.23
Benzene	8.77	3.78	10.00	6.59	10.00	6.50
Water	--	56.60	--	34.33	--	34.91
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	747	--	560	--	653	--
Reactor Pressure, psig	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.007055	--	0.002174	--	0.002327	--
Product Gas Rate, SCF/hr	2.5872	--	2.5165	--	2.5526	--
Product Benzene Rate, lb-mol/hr	0.000529	--	0.000616	--	0.000602	--
Product Gas Composition, mol %						
Carbon Monoxide	3.43	1.74	5.99	3.07	4.56	2.33
Carbon Dioxide	24.65	12.38	22.26	11.43	23.38	11.94
Hydrogen	42.91	21.93	41.36	21.22	42.06	21.58
Methane	17.66	8.94	17.91	9.19	17.67	9.03
Ethane	0.72	0.36	0.73	0.37	0.72	0.37
Propane	0.57	0.29	0.56	0.29	0.55	0.28
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.55	0.78	1.60	0.82	1.58	0.81
Nitrogen	0.94	0.47	0.95	0.49	0.94	0.48
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.10	0.05	0.10	0.05	0.10	0.05
Phenol	0.28	0.14	0.32	0.17	0.32	0.16
Benzene	7.18	3.61	8.21	4.31	8.11	4.14
Water	--	49.30	--	48.58	--	48.82
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000937	--	0.000759	--	0.000855	--
CO_2 Produced, lb-mol/hr	0.000936	--	0.000756	--	0.000854	--
H_2 Produced, lb-mol/hr	0.000920	--	0.000739	--	0.000837	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.94	--	0.76	--	0.86	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 10. KINETICS TESTS (UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	91		92		93	
Feed Water Rate, lb-mol/hr	0.008034		0.007985		0.008047	
Feed Gas Rate, SCF/hr	2.2229		2.2229		2.2229	
Feed Benzene Rate, lb-mol/hr	0.000636		0.000689		0.000678	
Feed H_2O/Gas Ratio (mol)	1.25		1.24		1.26	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol % *						
Carbon Monoxide	18.15	8.05	18.08	8.05	18.12	8.02
Carbon Dioxide	12.50	5.54	12.43	5.54	12.47	5.52
Hydrogen	34.49	15.30	34.42	15.30	34.46	15.25
Methane	20.40	9.05	20.32	9.05	20.36	9.02
Ethane	0.81	0.36	0.81	0.36	0.81	0.36
Propane	0.62	0.28	0.62	0.28	0.62	0.28
Butanes	0.09	0.04	0.09	0.04	0.09	0.04
Hydrogen Sulfide	1.89	0.84	1.89	0.84	1.89	0.83
Nitrogen	0.98	0.44	0.98	0.44	0.98	0.43
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.04	0.09	0.04	0.09	0.04
Phenol	0.34	0.15	0.34	0.16	0.34	0.16
Benzene	9.63	4.25	9.92	4.61	9.76	4.52
Water	--	55.65	--	55.28	--	55.52
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	553	--	660	--	749	--
Reactor Pressure, psig	500	--	500	--	500	--
Product Water Rate, lb-mol/hr	0.006883	--	0.006859	--	0.006822	--
Product Gas Rate, SCF/hr	2.5095	--	2.5408	--	2.5514	--
Product Benzene Rate, lb-mol/hr	0.000636	--	0.000622	--	0.000600	--
Product Gas Composition, mol %						
Carbon Monoxide	5.91	3.00	4.69	2.41	4.20	2.16
Carbon Dioxide	21.85	11.08	22.58	11.57	23.02	11.83
Hydrogen	41.38	21.08	41.71	21.47	42.20	21.74
Methane	18.73	9.49	18.38	9.42	18.35	9.44
Ethane	0.74	0.37	0.71	0.36	0.72	0.37
Propane	0.57	0.28	0.56	0.28	0.56	0.28
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.68	0.84	1.64	0.84	1.62	0.83
Nitrogen	0.89	0.45	0.87	0.45	0.87	0.45
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.10	0.05	0.10	0.05	0.10	0.05
Phenol	0.31	0.16	0.32	0.16	0.32	0.16
Benzene	7.83	3.98	8.43	4.30	8.03	4.16
Water	--	49.21	--	48.68	--	48.52
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000745	--	0.000825	--	0.000860	--
CO_2 Produced, lb-mol/hr	0.000744	--	0.000825	--	0.000858	--
H_2 Produced, lb-mol/hr	0.000730	--	0.000808	--	0.000839	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.75	--	0.83	--	0.86	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 11. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	94		95		96	
Feed Water Rate, lb-mol/hr	0.003258		0.003380		0.003429	
Feed Gas Rate, SCF/hr	2.2186		2.2186		2.2186	
Feed Benzene Rate, lb-mol/hr	0.000692		0.000689		0.000715	
Feed H_2O/Gas Ratio (mol)	0.51		0.53		0.53	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.10	11.95	18.08	11.81	18.02	11.72
Carbon Dioxide	12.47	8.23	12.43	8.13	12.37	8.07
Hydrogen	34.48	22.72	34.42	22.44	34.36	22.27
Methane	20.36	13.44	20.32	13.28	20.26	13.18
Ethane	0.81	0.54	0.81	0.53	0.81	0.52
Propane	0.62	0.42	0.62	0.41	0.62	0.40
Butanes	0.09	0.06	0.09	0.06	0.09	0.06
Hydrogen Sulfide	1.89	1.25	1.89	1.23	1.89	1.21
Nitrogen	0.98	0.63	0.98	0.63	0.98	0.62
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.06	0.09	0.06	0.09	0.06
Phenol	0.34	0.23	0.34	0.23	0.34	0.24
Benzene	9.76	6.88	9.92	6.77	10.16	6.98
Water	--	33.58	--	34.41	--	34.66
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	560	--	652	--	748	--
Reactor Pressure, psig	500	--	500	--	500	--
Product Water Rate, lb-mol/hr	0.002107	--	0.002254	--	0.002205	--
Product Gas Rate, SCF/hr	2.4816	--	2.5048	--	2.2186	--
Product Benzene Rate, lb-mol/hr	0.000619	--	0.000600	--	0.000642	--
Product Gas Composition, mol %						
Carbon Monoxide	6.74	5.19	5.90	4.48	5.52	4.22
Carbon Dioxide	21.07	16.23	21.77	16.53	21.90	16.75
Hydrogen	40.77	31.41	41.38	31.41	41.32	31.60
Methane	18.75	14.45	18.66	14.16	18.49	14.14
Ethane	0.69	0.53	0.69	0.52	0.70	0.53
Propane	0.57	0.44	0.56	0.43	0.56	0.43
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.59	1.22	1.61	1.22	1.60	1.23
Nitrogen	0.88	0.68	0.87	0.66	0.87	0.66
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.06	0.10	0.07	0.10	0.07
Phenol	0.33	0.25	0.32	0.25	0.33	0.26
Benzene	8.51	6.58	8.13	6.25	8.60	6.67
Water	--	22.95	--	24.01	--	23.43
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000686	--	0.000743	--	0.000766	--
CO_2 Produced, lb-mol/hr	0.000685	--	0.000744	--	0.000767	--
H_2 Produced, lb-mol/hr	0.000666	--	0.000726	--	0.000749	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.69	--	0.74	--	0.77	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 12. KINETICS TESTS (UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	97		98		99	
Feed Water Rate, lb-mol/hr	0.006063		0.006038		0.006124	
Feed Gas Rate, SCF/hr	2.2126		2.2126		2.2256	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000644		0.000658	
Feed H_2O/Gas Ratio (mol)	0.95		0.95		0.96	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.20	9.88	19.25	9.91	19.26	9.87
Carbon Dioxide	12.57	6.46	12.61	6.46	12.62	6.46
Hydrogen	32.36	16.64	32.42	16.67	32.44	16.62
Methane	20.83	10.72	20.88	10.75	20.90	10.72
Ethane	0.81	0.42	0.81	0.42	0.81	0.41
Propane	0.62	0.32	0.62	0.32	0.62	0.32
Butanes	0.09	0.05	0.09	0.05	0.09	0.05
Hydrogen Sulfide	1.88	0.97	1.88	0.97	1.88	0.96
Nitrogen	0.98	0.50	0.98	0.50	0.99	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.05	0.09	0.05	0.09	0.05
Phenol	0.36	0.18	0.36	0.18	0.34	0.18
Benzene	10.20	5.25	10.00	5.05	9.95	5.06
Water	--	48.55	--	48.66	--	48.78
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	563	--	660	--	747	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.004924	--	0.004862	--	0.005058	--
Product Gas Rate, SCF/hr	2.5246	--	2.5323	--	2.4976	--
Product Benzene Rate, lb-mol/hr	0.000619	--	0.000607	--	0.000594	--
Product Gas Composition, mol %						
Carbon Monoxide	7.61	4.55	6.48	3.87	6.04	3.55
Carbon Dioxide	21.46	12.81	22.34	13.32	22.54	13.24
Hydrogen	39.30	23.29	40.06	23.89	40.22	23.63
Methane	18.99	11.23	18.85	11.21	18.68	11.00
Ethane	0.73	0.43	0.70	0.42	0.72	0.42
Propane	0.56	0.33	0.56	0.33	0.57	0.33
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.61	0.95	1.61	0.96	1.64	0.96
Nitrogen	0.88	0.52	0.88	0.52	0.91	0.53
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.10	0.06	0.10	0.06	0.10	0.06
Phenol	0.32	0.19	0.32	0.19	0.31	0.18
Benzene	8.43	4.98	8.09	4.91	8.26	4.77
Water	--	40.65	--	40.31	--	41.32
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000701	--	0.000776	--	0.000806	--
CO_2 Produced, lb-mol/hr	0.000700	--	0.000775	--	0.000805	--
H_2 Produced, lb-mol/hr	0.000684	--	0.000747	--	0.000798	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.70	--	0.78	--	0.81	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 13. KINETICS TESTS (UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	100		101		102	
Feed Water Rate, lb-mol/hr	0.003393		0.008169		0.003368	
Feed Gas Rate, SCF/hr	2.2256		2.2240		2.2240	
Feed Benzene Rate, lb-mol/hr	0.000836		0.001408		0.001321	
Feed H_2O/Gas Ratio (mol)	0.53		1.13		0.48	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.30	12.64	17.25	8.07	17.47	11.85
Carbon Dioxide	12.65	8.28	11.30	5.29	11.44	7.76
Hydrogen	32.48	21.29	29.06	13.60	29.41	19.95
Methane	20.95	13.72	18.73	8.76	18.96	12.86
Ethane	0.81	0.53	0.72	0.34	0.73	0.50
Propane	0.62	0.40	0.56	0.26	0.56	0.38
Butanes	0.09	0.06	0.08	0.04	0.08	0.06
Hydrogen Sulfide	1.88	1.23	1.68	0.79	1.70	1.16
Nitrogen	0.99	0.65	0.89	0.42	0.90	0.61
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.06	0.08	0.04	0.08	0.06
Phenol	0.34	0.23	--	--	--	--
Benzene	9.79	6.26	19.64	9.17	18.66	12.62
Water	--	34.64	--	53.21	--	32.18
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	748	--	663	--	654	--
Reactor Pressure, psig	200	--	1000	1000	1000	1000
Product Water Rate, lb-mol/hr	0.002339	--	0.006895	--	0.002205	--
Product Gas Rate, SCF/hr	2.5162	--	2.5437	--	2.5641	--
Product Benzene Rate, lb-mol/hr	0.000577	--	0.001300	--	0.001229	--
Product Gas Composition, mol %						
Carbon Monoxide	6.81	5.12	3.56	1.92	4.58	3.58
Carbon Dioxide	22.10	16.63	21.97	11.82	21.43	16.75
Hydrogen	39.87	30.00	37.89	20.39	37.64	29.42
Methane	19.21	14.46	17.04	9.17	17.15	13.40
Ethane	0.72	0.54	0.65	0.35	0.66	0.52
Propane	0.56	0.42	0.50	0.27	0.52	0.41
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.62	1.22	1.42	0.76	1.47	1.15
Nitrogen	0.90	0.68	0.78	0.42	0.80	0.62
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.10	0.07	0.09	0.05	0.09	0.07
Phenol	0.28	0.21	--	--	--	--
Benzene	7.82	5.95	16.09	8.75	15.65	12.18
Water	--	24.69	--	46.09	--	21.89
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000757	--	0.000954	--	0.000879	--
CO_2 Produced, lb-mol/hr	0.000756	--	0.000953	--	0.000878	--
H_2 Produced, lb-mol/hr	0.000740	--	0.000950	--	0.000870	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.76	--	0.95	--	0.88	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-3, Part 14. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	103		104		105	
Feed Water Rate, lb-mol/hr	0.007885		0.007826		0.007802	
Feed Gas Rate, SCF/hr	2.2126		2.2126		2.2126	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000679		0.000678	
Feed H_2O/Gas Ratio (mol)	1.20		1.20		1.21	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.62	8.36	18.62	8.39	18.62	8.41
Carbon Dioxide	12.25	5.50	12.25	5.52	12.25	5.53
Hydrogen	34.29	15.39	34.28	15.45	34.28	15.48
Methane	19.70	8.84	19.69	8.88	19.69	8.89
Ethane	0.81	0.36	0.81	0.36	0.81	0.37
Propane	0.62	0.28	0.62	0.28	0.62	0.28
Butanes	0.09	0.04	0.09	0.04	0.09	0.04
Hydrogen Sulfide	1.96	0.88	1.96	0.88	1.96	0.88
Nitrogen	0.98	0.44	0.98	0.44	0.98	0.44
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.04	0.09	0.04	0.09	0.04
Phenol	0.34	0.15	0.34	0.14	0.34	0.15
Benzene	10.24	4.74	10.26	4.76	10.26	4.77
Water	--	54.87	--	54.81	--	54.71
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	560	--	661	--	749	--
Reactor Pressure, psig	100	--	100	--	100	--
Product Water Rate, lb-mol/hr	0.006614	--	0.006528	--	0.006467	--
Product Gas Rate, SCF/hr	2.3601	--	2.3767	--	2.3852	--
Product Benzene Rate, lb-mol/hr	0.000622	--	0.000622	--	0.000616	--
Product Gas Composition, mol %						
Carbon Monoxide	12.22	6.17	11.47	5.85	11.10	5.69
Carbon Dioxide	17.22	8.70	17.77	9.06	18.07	9.24
Hydrogen	37.96	19.17	38.38	19.57	38.53	19.81
Methane	19.01	9.60	18.88	9.62	18.81	9.63
Ethane	0.77	0.39	0.76	0.39	0.76	0.39
Propane	0.59	0.30	0.59	0.30	0.58	0.30
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.75	0.88	1.74	0.88	1.75	0.90
Nitrogen	0.93	0.47	0.93	0.47	0.93	0.47
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.04	0.03	0.02	0.09	0.05
Phenol	0.30	0.15	0.29	0.15	0.29	0.15
Benzene	9.15	4.65	9.15	4.65	9.08	4.64
Water	--	49.47	--	49.03	--	48.72
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000371	--	0.000417	--	0.000440	--
CO_2 Produced, lb-mol/hr	0.000375	--	0.000420	--	0.000443	--
H_2 Produced, lb-mol/hr	0.000360	--	0.000405	--	0.000428	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.37	--	0.42	--	0.44	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B76122652g

Table B-3, Part 15. KINETICS TESTS (UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	106		107		108	
Feed Water Rate, lb-mol/hr	0.003331		0.003270		0.007887	
Feed Gas Rate, SCF/hr	2.2141		2.2141		2.2149	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000735		0.000678	
Feed H_2O/Gas Ratio (mol)	0.52		0.50		1.23	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.64	12.28	18.48	12.28	18.89	8.49
Carbon Dioxide	12.24	8.07	12.14	8.07	12.28	5.52
Hydrogen	34.30	22.59	34.00	22.58	34.06	15.25
Methane	19.69	12.77	19.50	12.95	19.89	8.73
Ethane	0.81	0.53	0.80	0.53	0.81	0.36
Propane	0.62	0.41	0.62	0.41	0.62	0.28
Butanes	0.09	0.06	0.09	0.06	0.09	0.04
Hydrogen Sulfide	1.96	1.29	1.94	1.29	1.96	0.88
Nitrogen	0.98	0.65	0.97	0.65	0.92	0.41
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.06	0.09	0.06	0.09	0.04
Phenol	0.34	0.23	0.36	0.24	0.34	0.15
Benzene	10.23	6.95	11.00	7.54	10.04	4.74
Water	--	34.10	--	33.33	--	55.10
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	558	--	659	--	556	--
Reactor Pressure, psig	100	--	100	--	50	--
Product Water Rate, lb-mol/hr	0.002143	--	0.002033	--	0.006614	--
Product Gas Rate, SCF/hr	2.3366	--	2.3448	--	2.3142	--
Product Benzene Rate, lb-mol/hr	0.000625	--	0.000684	--	0.000619	--
Product Gas Composition, mol %						
Carbon Monoxide	13.28	10.06	12.58	9.68	14.52	7.27
Carbon Dioxide	16.43	12.44	16.70	12.85	15.59	7.80
Hydrogen	37.36	28.30	37.36	28.74	36.54	18.31
Methane	19.19	14.53	18.92	14.55	19.57	9.79
Ethane	0.78	0.59	0.77	0.59	0.78	0.39
Propane	0.59	0.45	0.59	0.45	0.60	0.30
Butanes	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.76	1.34	1.73	1.33	1.78	0.89
Nitrogen	0.94	0.71	0.92	0.70	0.88	0.44
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.07	0.09	0.07	0.09	0.05
Phenol	0.30	0.22	0.30	0.23	0.30	0.15
Benzene	9.27	7.07	10.03	7.77	9.34	4.67
Water	--	24.21	--	23.03	--	49.93
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000309	--	0.000346	--	0.000253	--
CO_2 Produced, lb-mol/hr	0.000312	--	0.000344	--	0.000243	--
H_2 Produced, lb-mol/hr	0.000296	--	0.000326	--	0.000237	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.31	--	0.35	--	0.25	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B76122652h

Table B-3, Part 16. KINETICS TESTS (UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	109		110		111	
Feed Water Rate, lb-mol/hr	0.007887		0.003356		0.008022	
Feed Gas Rate, SCF/hr	2.2149		2.2149		2.2113	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000670		0.000655	
Feed H_2O/Gas Ratio (mol)	1.23		0.52		1.24	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol % *						
Carbon Monoxide	18.89	8.49	18.86	12.40	21.00	9.36
Carbon Dioxide	12.28	5.52	12.26	8.06	15.61	6.96
Hydrogen	34.06	15.28	33.97	22.33	25.12	11.20
Methane	19.89	8.90	19.85	13.05	24.02	10.71
Ethane	0.81	0.36	0.81	0.53	0.99	0.44
Propane	0.62	0.28	0.62	0.41	0.73	0.32
Butane	0.09	0.04	0.09	0.06	0.09	0.04
Hydrogen Sulfide	1.96	0.88	1.96	1.28	0.51	0.23
Nitrogen	0.92	0.41	0.92	0.59	0.88	0.39
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.04	0.09	0.06	0.03	0.02
Phenol	0.34	0.15	0.34	0.22	0.87	0.39
Benzene	10.04	4.54	10.22	6.84	10.14	4.53
Water	--	55.10	--	34.16	--	55.40
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	658	--	659	--	554	--
Reactor Pressure, psig	50	--	50	--	1000	--
Product Water Rate, lb-mol/hr	0.006589	--	0.002107	--	0.006748	--
Product Gas Rate, SCF/hr	2.3302	--	2.3062	--	2.5573	--
Product Benzene Rate, lb-mol/hr	0.000622	--	0.000611	--	0.000603	--
Product Gas Composition, mol %						
Carbon Monoxide	13.78	6.94	14.90	11.30	6.13	3.18
Carbon Dioxide	16.05	8.09	15.28	11.59	26.21	13.62
Hydrogen	37.86	18.57	36.32	27.55	34.39	17.86
Methane	19.41	9.77	19.61	14.88	21.46	11.15
Ethane	0.78	0.39	0.79	0.60	0.88	0.46
Propane	0.60	0.30	0.60	0.46	0.64	0.33
Butane	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	1.77	0.89	1.78	1.35	0.41	0.21
Nitrogen	0.22	0.44	0.88	0.66	0.78	0.41
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.09	0.05	0.09	0.07	0.03	0.02
Phenol	0.30	0.15	0.30	0.23	0.71	0.37
Benzene	9.13	4.68	9.44	7.00	8.35	4.29
Water	--	49.72	--	24.30	--	48.09
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000293	--	0.000229	--	0.000908	--
CO_2 Produced, lb-mol/hr	0.000294	--	0.000221	--	0.000904	--
H_2 Produced, lb-mol/hr	0.000278	--	0.000216	--	0.000887	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.29	--	0.23	--	0.91	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B761226521

Table B-3, Part 17. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	112		113		114	
Feed Water Rate, lb-mol/hr	0.007998		0.007961		0.003503	
Feed Gas Rate, SCF/hr	2.2113		2.2113		2.2148	
Feed Benzene Rate, lb-mol/hr	0.000659		0.000653		0.000678	
Feed H_2O/Gas Ratio (mol)	1.24		1.23		0.54	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol % *						
Carbon Monoxide	20.99	9.37	21.00	9.40	20.87	13.56
Carbon Dioxide	15.62	6.97	15.64	6.99	15.55	10.09
Hydrogen	25.11	11.21	25.13	11.25	25.00	16.25
Methane	24.00	10.72	24.03	10.75	23.96	15.57
Ethane	0.99	0.44	0.99	0.44	0.97	0.63
Propane	0.73	0.33	0.73	0.36	0.71	0.46
Butane	0.09	0.04	0.09	0.04	0.09	0.06
Hydrogen Sulfide	0.51	0.23	0.51	0.23	0.49	0.32
Nitrogen	0.88	0.39	0.88	0.39	0.91	0.58
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Phenol	0.87	0.38	0.86	0.38	0.91	0.58
Benzene	10.17	4.56	10.10	4.53	10.50	6.79
Water	--	55.33	--	55.21	--	35.08
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	657	--	749	--	552	--
Reactor Pressure, psig	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.006736	--	0.006650	--	0.002217	--
Product Gas Rate, SCF/hr	2.5969	--	2.6172	--	2.5336	--
Product Benzene Rate, lb-mol/hr	0.000596	--	0.000594	--	0.000622	--
Product Gas Composition, mol %						
Carbon Monoxide	4.75	2.48	4.17	2.20	7.29	5.59
Carbon Dioxide	27.21	14.24	27.62	14.58	25.33	19.40
Hydrogen	35.35	18.49	35.65	18.82	33.56	25.70
Methane	21.19	11.09	21.19	11.14	21.63	15.57
Ethane	0.87	0.45	0.85	0.45	0.87	0.67
Propane	0.64	0.33	0.63	0.33	0.63	0.49
Butane	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	0.41	0.21	0.40	0.21	0.41	0.32
Nitrogen	0.77	0.40	0.77	0.40	0.81	0.61
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Phenol	0.70	0.37	0.70	0.37	0.74	0.57
Benzene	8.07	4.22	7.98	4.22	8.69	6.57
Water	--	47.69	--	47.25	--	24.48
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.001004	--	0.001045	--	0.000826	--
CO_2 Produced, lb-mol/hr	0.001003	--	0.001047	--	0.000829	--
H_2 Produced, lb-mol/hr	0.000991	--	0.001031	--	0.000821	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	1.0	--	1.04	--	0.83	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B76122652j

Table B-3, Part 18. KINETICS TESTS
(UC-1870-46-1 Shift Catalyst, 1/16-Inch Extrudates, 10.00 g)

Run No.	115		116		117	
Feed Water Rate, lb-mol/hr	0.003503		0.003503		0.006332	
Feed Gas Rate, SCF/hr	2.2148		2.2148		2.2170	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000678		0.000667	
Feed H_2O/Gas Ratio (mol)	0.54		0.54		0.98	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.87	13.56	20.87	13.56	20.94	10.59
Carbon Dioxide	15.55	10.09	15.55	10.09	15.59	7.88
Hydrogen	25.00	16.25	25.00	16.25	25.08	12.67
Methane	23.96	15.57	23.96	15.57	23.99	12.12
Ethane	0.97	0.63	0.97	0.63	0.97	0.49
Propane	0.71	0.46	0.71	0.46	0.73	0.36
Butane	0.09	0.06	0.09	0.06	0.09	0.05
Hydrogen Sulfide	0.49	0.32	0.49	0.32	0.49	0.25
Nitrogen	0.91	0.58	0.91	0.58	0.90	0.45
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Phenol	0.91	0.58	0.91	0.58	0.89	0.45
Benzene	10.50	6.79	10.50	6.79	10.29	5.21
Water	--	35.08	--	35.08	--	49.45
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	653	--	750	--	552	--
Reactor Pressure, psig	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.002266	--	0.002266	--	0.005071	--
Product Gas Rate, SCF/hr	2.5825	--	2.5875	--	2.5445	--
Product Benzene Rate, lb-mol/hr	0.000631	--	0.000642	--	0.000620	--
Product Gas Composition, mol %						
Carbon Monoxide	5.54	4.24	5.36	4.10	6.87	4.05
Carbon Dioxide	26.51	20.23	26.60	20.37	25.64	15.11
Hydrogen	34.64	26.56	34.88	26.72	34.08	20.09
Methane	21.34	16.33	21.27	16.29	21.50	12.75
Ethane	0.87	0.66	0.86	0.66	0.88	0.52
Propane	0.62	0.48	0.62	0.47	0.65	0.38
Butane	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide	0.39	0.30	0.39	0.30	0.41	0.24
Nitrogen	0.78	0.60	0.78	0.60	0.80	0.47
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Phenol	0.73	0.56	0.73	0.56	0.72	0.43
Benzene	8.54	6.54	8.66	6.49	8.41	5.02
Water	--	23.47	--	23.41	--	40.91
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000946	--	0.000958	--	0.000858	--
CO_2 Produced, lb-mol/hr	0.000951	--	0.000964	--	0.000856	--
H_2 Produced, lb-mol/hr	0.000941	--	0.000943	--	0.000840	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.95	--	0.96	--	0.86	--

* Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B76122652k

Table B-4, Part 1. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	1		2		3	
Feed Water Rate, lb-mol/hr	0.007875		0.007985		0.007912	
Feed Gas Rate, SCF/hr	2.2130		2.2130		2.2130	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.36		1.38		1.37	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %[a]						
Carbon Monoxide	21.80	9.19	21.80	9.12	21.80	9.17
Carbon Dioxide	19.45	8.20	19.45	8.14	19.45	8.18
Hydrogen	31.50	13.28	31.50	13.17	31.50	13.25
Methane	24.31	10.26	24.31	10.04	24.31	10.23
Ethane	0.78	0.32	0.78	0.32	0.78	0.32
Propane	0.22	0.09	0.22	0.09	0.22	0.10
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.90	0.38	0.90	0.38	0.90	0.38
Nitrogen	0.90	0.38	0.90	0.38	0.90	0.38
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	57.83	--	58.24	--	57.92
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	659	--	664	--	753	--
Reactor Pressure, psig	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.006687	--	0.006810	--	0.006650	--
Product Gas Rate, SCF/hr	2.5484	--	2.5874	--	2.6076	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	5.67	2.82	4.10	2.03	3.52	1.77
Carbon Dioxide	30.21	14.97	32.15	15.46	31.54	15.91
Hydrogen	40.39	20.18	42.42	20.58	41.78	21.07
Methane	21.26	10.51	18.85	9.06	20.70	10.46
Ethane	0.67	0.32	0.67	0.33	0.66	0.33
Propane	0.19	0.10	0.19	0.09	0.19	0.10
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.74	0.37	0.75	0.37	0.73	0.36
Nitrogen	0.78	0.38	0.78	0.38	0.79	0.39
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	50.30	--	51.65	--	49.56
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000877	--	0.000977	--	0.001014	--
CO_2 Produced, lb-mol/hr	0.000875	--	0.000975	--	0.001018	--
H_2 Produced, lb-mol/hr	0.000863	--	0.000966	--	0.001009	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.88	--	0.98	--	1.01	--

[a]Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056a

Table B-4, Part 2. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	4		5		6	
Feed Water Rate, lb-mol/hr	0.003405		0.003478		0.003466	
Feed Gas Rate, SCF/hr	2.2301		2.2301		2.2301	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	0.58		0.60		0.59	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.80	13.73	21.80	13.62	21.80	13.64
Carbon Dioxide	19.45	12.25	19.45	12.15	19.45	12.14
Hydrogen	31.50	19.83	31.50	19.67	31.50	19.66
Methane	24.31	15.30	24.31	15.18	24.31	15.18
Ethane	0.78	0.49	0.78	0.48	0.78	0.48
Propane	0.22	0.14	0.22	0.14	0.22	0.14
Butane	0.08	0.05	0.08	0.05	0.08	0.05
Hydrogen Sulfide	0.90	0.56	0.90	0.56	0.90	0.56
Nitrogen	0.90	0.56	0.90	0.56	0.90	0.56
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	37.05	--	37.55	--	37.55
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	557	--	654	--	752	--
Reactor Pressure, psig	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.002254	--	0.002205	--	0.002082	--
Product Gas Rate, SCF/hr	2.5499	--	2.5889	--	2.6090	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	6.27	4.68	4.49	3.38	4.28	3.27
Carbon Dioxide	29.72	22.17	30.88	23.25	31.02	23.73
Hydrogen	40.29	30.00	41.26	31.01	41.34	31.62
Methane	21.26	15.86	20.89	15.73	20.87	15.96
Ethane	0.66	0.50	0.67	0.50	0.68	0.52
Propane	0.19	0.15	0.18	0.13	0.19	0.15
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.74	0.55	0.75	0.52	0.75	0.58
Nitrogen	0.78	0.59	0.79	0.55	0.78	0.56
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	25.44	--	24.87	--	23.55
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000847	--	0.000960	--	0.000960	--
CO_2 Produced, lb-mol/hr	0.000841	--	0.000949	--	0.000970	--
H_2 Produced, lb-mol/hr	0.000834	--	0.000945	--	0.000967	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.85	--	0.96	--	0.97	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056b

Table B-4, Part 3. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	7		8		9	
Feed Water Rate, lb-mol/hr	0.006124		0.006136		0.007888	
Feed Gas Rate, SCF/hr	2.2334		2.2334		2.2287	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.05		1.06		1.36	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.80	10.60	21.80	10.61	21.25	8.99
Carbon Dioxide	19.45	9.46	19.45	9.47	18.90	8.00
Hydrogen	31.50	15.31	31.50	15.33	33.20	14.05
Methane	24.31	11.82	24.31	11.84	23.72	10.03
Ethane	0.78	0.38	0.78	0.38	0.76	0.32
Propane	0.22	0.10	0.22	0.10	0.20	0.08
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.90	0.44	0.90	0.44	0.97	0.41
Nitrogen	0.90	0.44	0.90	0.44	0.86	0.37
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	51.37	--	51.31	--	57.68
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	559	--	654	--	552	--
Reactor Pressure, psig	1000	--	1000	--	500	--
Product Water Rate, lb-mol/hr	0.004960	--	0.004923	--	0.006602	--
Product Gas Rate, SCF/hr	2.5731	--	2.6128	--	2.5281	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	5.91	3.39	4.28	2.46	7.17	3.52
Carbon Dioxide	29.96	17.19	31.02	17.97	28.38	14.10
Hydrogen	40.44	23.20	41.37	23.95	40.94	20.42
Methane	21.20	12.16	20.85	12.08	20.98	10.46
Ethane	0.68	0.39	0.68	0.39	0.67	0.33
Propane	0.19	0.11	0.19	0.11	0.18	0.09
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.75	0.43	0.74	0.43	0.63	0.41
Nitrogen	0.78	0.45	0.78	0.44	0.76	0.38
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	42.62	--	42.09	--	50.24
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000869	--	0.000978	--	0.000770	--
CO_2 Produced, lb-mol/hr	0.000873	--	0.000976	--	0.000762	--
H_2 Produced, lb-mol/hr	0.000863	--	0.000974	--	0.000763	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.87	--	0.97	--	0.77	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056c

Table B-4, Part 4. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	10		11		12	
Feed Water Rate, lb-mol/hr	0.007946		0.007838		0.003331	
Feed Gas Rate, SCF/hr	2.2287		2.2287		2.2379	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.37		1.35		0.56	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.25	8.95	21.25	9.02	21.25	13.50
Carbon Dioxide	18.90	7.96	18.90	8.03	18.90	12.01
Hydrogen	33.20	13.99	33.20	14.10	33.20	21.09
Methane	23.72	9.98	23.72	10.07	23.72	15.08
Ethane	0.76	0.32	0.76	0.32	0.76	0.48
Propane	0.20	0.08	0.20	0.08	0.20	0.13
Butane	0.08	0.04	0.08	0.04	0.08	0.06
Hydrogen Sulfide	0.97	0.41	0.97	0.41	0.97	0.61
Nitrogen	0.86	0.36	0.86	0.37	0.86	0.55
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	57.88	--	57.53	--	36.45
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	660	--	752	--	561	--
Reactor Pressure, psig	500	--	500	--	500	--
Product Water Rate, lb-mol/hr	0.006748	--	0.006711	--	0.002217	--
Product Gas Rate, SCF/hr	2.5471	--	2.5567	--	2.5022	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	5.94	2.94	5.55	2.76	8.57	6.39
Carbon Dioxide	29.14	14.42	29.60	14.62	27.38	20.42
Hydrogen	41.67	20.54	41.66	20.72	40.25	29.82
Methane	20.76	10.28	20.68	10.28	21.28	15.86
Ethane	0.66	0.32	0.67	0.33	0.66	0.49
Propane	0.17	0.08	0.17	0.08	0.17	0.14
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.82	0.40	0.83	0.40	0.83	0.62
Nitrogen	0.75	0.37	0.75	0.37	0.77	0.57
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	50.60	--	50.39	--	25.63
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000836	--	0.000861	--	0.000683	--
CO_2 Produced, lb-mol/hr	0.000833	--	0.000857	--	0.000675	--
H_2 Produced, lb-mol/hr	0.000823	--	0.000845	--	0.000670	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.84	--	0.86	--	0.68	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B770100056d

Table B-4, Part 5. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	13		14		15	
Feed Water Rate, lb-mol/hr	0.003429		0.003429		0.007863	
Feed Gas Rate, SCF/hr	2.2379		2.2379		2.2289	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	0.58		0.58		1.35	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.25	13.36	21.25	13.36	21.35	9.05
Carbon Dioxide	18.90	11.88	18.90	11.88	19.09	8.10
Hydrogen	33.20	20.87	33.20	20.87	32.67	13.85
Methane	23.72	14.92	23.72	14.92	23.90	10.13
Ethane	0.76	0.48	0.76	0.48	0.79	0.34
Propane	0.20	0.13	0.20	0.13	0.22	0.10
Butane	0.08	0.06	0.08	0.05	0.09	0.04
Hydrogen Sulfide	0.97	0.61	0.97	0.61	0.93	0.40
Nitrogen	0.86	0.54	0.86	0.54	0.90	0.39
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	37.11	--	37.12	--	57.57
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	659	--	753	--	562	--
Reactor Pressure, psig	500	--	500	--	200	--
Product Water Rate, lb-mol/hr	0.002241	--	0.002168	--	0.006589	--
Product Gas Rate, SCF/hr	2.5396	--	2.5492	--	2.4738	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	6.93	5.17	6.53	4.92	9.44	4.66
Carbon Dioxide	28.38	21.18	28.74	21.65	26.87	13.31
Hydrogen	41.23	30.60	41.30	31.04	39.48	19.14
Methane	20.95	15.63	20.91	15.70	21.60	10.66
Ethane	0.67	0.50	0.67	0.50	0.71	0.35
Propane	0.17	0.12	0.17	0.13	0.20	0.09
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.82	0.59	0.83	0.60	0.80	0.39
Nitrogen	0.76	0.56	0.76	0.57	0.81	0.39
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.02	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	25.59	--	24.84	--	50.96
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000783	--	0.000807	--	0.000629	--
CO_2 Produced, lb-mol/hr	0.000773	--	0.000804	--	0.000627	--
H_2 Produced, lb-mol/hr	0.000769	--	0.000794	--	0.000600	--
Rate of CO Conversion $\times 10^{-4}$ lb-mol/hr-g catalyst	0.78	--	0.80	--	0.63	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056e

Table B-4, Part 6. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	16		17		18	
Feed Water Rate, lb-mol/hr	0.008132		0.007802		0.006124	
Feed Gas Rate, SCF/hr	2.2289		2.2289		2.2372	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.4		1.34		1.05	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.35	8.87	21.35	9.09	21.35	10.39
Carbon Dioxide	19.09	7.94	19.09	8.13	19.09	9.29
Hydrogen	32.67	13.58	32.67	13.91	32.67	15.90
Methane	23.90	9.94	23.90	10.18	23.90	11.63
Ethane	0.79	0.33	0.79	0.34	0.79	0.39
Propane	0.22	0.09	0.22	0.10	0.22	0.11
Butane	0.09	0.04	0.09	0.04	0.09	0.04
Hydrogen Sulfide	0.93	0.39	0.93	0.40	0.93	0.45
Nitrogen	0.90	0.38	0.90	0.38	0.90	0.44
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	58.41	--	57.40	--	51.32
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	658	--	754	--	560	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.006944	--	0.006418	--	0.005022	--
Product Gas Rate, SCF/hr	2.4829	--	2.4921	--	2.4740	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	8.98	4.32	8.38	4.21	9.64	5.41
Carbon Dioxide	27.22	13.11	27.69	13.90	26.83	15.25
Hydrogen	39.65	18.99	39.81	19.96	39.26	21.89
Methane	21.52	10.36	21.49	10.74	21.64	12.15
Ethane	0.71	0.34	0.71	0.36	0.71	0.40
Propane	0.20	0.10	0.20	0.10	0.20	0.11
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.80	0.39	0.80	0.40	0.80	0.45
Nitrogen	0.83	0.39	0.83	0.41	0.83	0.46
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	51.95	--	49.87	--	43.82
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000659	--	0.000693	--	0.000621	--
CO_2 Produced, lb-mol/hr	0.000650	--	0.000687	--	0.000614	--
H_2 Produced, lb-mol/hr	0.000650	--	0.000682	--	0.000610	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.66	--	0.69	--	0.62	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056f

Table B-4, Part 7. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	19		20		21	
Feed Water Rate, lb-mol/hr	0.006050		0.006124		0.003380	
Feed Gas Rate, SCF/hr	2.2372		2.2372		2.2119	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.04		1.05		0.58	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.35	10.46	21.35	10.39	21.35	13.44
Carbon Dioxide	19.09	9.35	19.09	9.29	19.09	12.01
Hydrogen	32.67	16.00	32.67	15.90	32.67	20.57
Methane	23.90	11.71	23.40	11.63	23.90	15.04
Ethane	0.79	0.39	0.79	0.39	0.79	0.49
Propane	0.22	0.11	0.22	0.11	0.22	0.14
Butane	0.09	0.04	0.09	0.04	0.09	0.05
Hydrogen Sulfide	0.93	0.46	0.93	0.45	0.93	0.58
Nitrogen	0.90	0.44	0.90	0.44	0.90	0.57
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	51.00	--	51.32	--	37.07
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	657	--	758	--	563	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.004850	--	0.004936	--	0.002241	--
Product Gas Rate, SCF/hr	2.4831	--	2.5014	--	2.4275	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	9.23	5.27	8.60	4.88	10.50	7.75
Carbon Dioxide	27.09	15.46	27.56	15.66	26.32	19.42
Hydrogen	39.51	22.45	39.81	22.53	38.66	28.48
Methane	21.54	12.31	21.43	12.18	21.90	16.08
Ethane	0.71	0.04	0.71	0.04	0.72	0.53
Propane	0.20	0.11	0.20	0.11	0.20	0.15
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.80	0.44	0.79	0.45	0.79	0.55
Nitrogen	0.83	0.46	0.81	0.45	0.82	0.61
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.04
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	43.42	--	43.64	--	26.36
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000645	--	0.000687	--	0.000567	--
CO_2 Produced, lb-mol/hr	0.000637	--	0.000681	--	0.000563	--
H_2 Produced, lb-mol/hr	0.000637	--	0.000673	--	0.000554	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.65	--	0.69	--	0.57	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056g

Table B-4, Part 8. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	22		23		24	
Feed Water Rate, lb-mol/hr	0.003411		0.003389		0.007985	
Feed Gas Rate, SCF/hr	2.2119		2.2119		2.2275	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	0.59		0.59		1.38	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.35	13.39	21.35	13.42	20.90	8.77
Carbon Dioxide	19.09	11.97	19.09	12.00	18.95	7.96
Hydrogen	32.67	20.50	32.67	20.54	33.70	14.16
Methane	23.90	14.99	23.90	15.02	23.54	9.88
Ethane	0.79	0.49	0.79	0.49	0.74	0.31
Propane	0.22	0.14	0.22	0.14	0.21	0.08
Butane	0.09	0.05	0.09	0.05	0.08	0.04
Hydrogen Sulfide	0.93	0.58	0.93	0.58	0.98	0.42
Nitrogen	0.90	0.57	0.90	0.57	0.84	0.35
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	37.28	--	37.15	--	58.00
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	663	--	752	--	555	--
Reactor Pressure, psig	200	--	200	--	100	--
Product Water Rate, lb-mol/hr	0.002192	--	0.002131	--	0.006822	--
Product Gas Rate, SCF/hr	2.4451	--	2.4540	--	2.3760	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	9.86	7.33	9.23	6.92	13.54	6.43
Carbon Dioxide	26.81	19.86	27.10	20.31	23.91	11.30
Hydrogen	38.92	28.93	39.46	29.45	37.73	17.88
Methane	21.80	16.05	21.61	16.11	22.20	10.49
Ethane	0.72	0.53	0.71	0.53	0.69	0.33
Propane	0.20	0.15	0.20	0.15	0.20	0.09
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.78	0.55	0.78	0.56	0.85	0.40
Nitrogen	0.82	0.61	0.82	0.60	0.79	0.37
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.04	0.05	0.04	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	25.92	--	25.30	--	52.66
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000604	--	0.000638	--	0.000378	--
CO_2 Produced, lb-mol/hr	0.000600	--	0.000631	--	0.000373	--
H_2 Produced, lb-mol/hr	0.000591	--	0.000628	--	0.000369	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.60	--	0.64	--	0.38	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056h

Table B-4, Part 9. KINETICS TESTS
(Shell 583 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	25		26		27	
Feed Water Rate, lb-mol/hr	0.007921		0.007985		0.003312	
Feed Gas Rate, SCF/hr	2.2275		2.2275		2.2213	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.36		1.37		0.57	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.90	8.81	20.90	8.77	20.90	13.27
Carbon Dioxide	18.95	8.00	18.95	7.96	18.95	12.04
Hydrogen	33.70	14.22	33.70	14.16	33.70	21.40
Methane	23.54	9.93	23.54	9.88	23.54	14.96
Ethane	0.74	0.31	0.74	0.31	0.74	0.47
Propane	0.21	0.08	0.21	0.08	0.21	0.13
Butane	0.08	0.04	0.08	0.04	0.08	0.06
Hydrogen Sulfide	0.98	0.42	0.98	0.45	0.98	0.63
Nitrogen	0.84	0.35	0.84	0.35	0.84	0.53
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	57.81	--	58.00	--	36.47
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	652	--	751	--	554	--
Reactor Pressure, psig	100	--	100	--	100	--
Product Water Rate, lb-mol/hr	0.006595	--	0.006822	--	0.002143	--
Product Gas Rate, SCF/hr	2.3928	--	2.4098	--	2.3370	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	12.65	6.14	11.79	5.64	14.85	11.00
Carbon Dioxide	24.42	11.84	24.93	11.85	22.93	16.94
Hydrogen	38.32	18.53	38.70	18.49	36.93	27.28
Methane	21.98	10.66	22.00	10.42	22.61	16.57
Ethane	0.69	0.34	0.68	0.33	0.70	0.52
Propane	0.20	0.09	0.19	0.09	0.20	0.15
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.86	0.41	0.85	0.40	0.85	0.63
Nitrogen	0.79	0.37	0.77	0.36	0.80	0.58
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.04
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	51.57	--	52.37	--	26.26
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000422	--	0.000471	--	0.000302	--
CO_2 Produced, lb-mol/hr	0.000419	--	0.000463	--	0.000298	--
H_2 Produced, lb-mol/hr	0.000425	--	0.000469	--	0.000297	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.42	--	0.47	--	0.30	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B770100561

Table B-4, Part 10. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	28		29		30	
Feed Water Rate, lb-mol/hr	0.003380		0.003347		0.007888	
Feed Gas Rate, SCF/hr	2.2213		2.2213		2.2301	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	0.57		0.56		1.36	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.90	13.17	20.90	13.22	20.75	8.78
Carbon Dioxide	18.95	11.95	18.95	12.00	18.80	7.95
Hydrogen	33.70	21.24	33.70	21.32	34.23	14.49
Methane	23.54	14.85	23.54	14.90	23.36	9.88
Ethane	0.74	0.47	0.74	0.47	0.72	0.31
Propane	0.21	0.13	0.21	0.13	0.20	0.09
Butane	0.08	0.06	0.08	0.05	0.08	0.04
Hydrogen Sulfide	0.98	0.62	0.98	0.63	0.98	0.42
Nitrogen	0.84	0.52	0.84	0.53	0.82	0.34
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	36.95	--	36.71	--	57.67
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	653	--	755	--	561	--
Reactor Pressure, psig	100	--	100	--	50	--
Product Water Rate, lb-mol/hr	0.002119	--	0.002205	--	0.006589	--
Product Gas Rate, SCF/hr	2.3657	--	2.3867	--	2.3540	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	13.54	10.06	12.66	9.33	14.56	7.01
Carbon Dioxide	23.84	17.70	24.41	18.00	22.87	11.00
Hydrogen	37.76	28.00	38.14	28.18	37.69	18.08
Methane	22.23	16.43	21.96	16.20	22.28	10.66
Ethane	0.69	0.51	0.69	0.51	0.68	0.33
Propane	0.20	0.15	0.20	0.14	0.19	0.09
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.86	0.63	0.86	0.62	0.86	0.41
Nitrogen	0.79	0.58	0.79	0.57	0.78	0.37
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.04	0.05	0.04	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	25.87	--	26.38	--	52.00
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000374	--	0.000421	--	0.000311	--
CO_2 Produced, lb-mol/hr	0.000369	--	0.000419	--	0.000310	--
H_2 Produced, lb-mol/hr	0.000370	--	0.000424	--	0.000314	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.37	--	0.42	--	0.31	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056j

Table B-4, Part 11. KINETICS TESTS (Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	31		32		33	
Feed Water Rate, lb-mol/hr	0.007798		0.007937		0.006124	
Feed Gas Rate, SCF/hr	2.2301		2.2301		2.2146	
Feed Benzene Rate, lb-mol/hr	--		--		0.000678	
Feed H_2O/Gas Ratio (mol)	1.35		1.36		0.95	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	20.75	8.84	20.75	8.75	18.30	9.40
Carbon Dioxide	18.80	8.01	18.80	7.93	17.12	8.80
Hydrogen	34.23	14.59	34.23	14.44	29.23	15.00
Methane	23.36	9.95	23.36	9.85	21.71	11.15
Ethane	0.72	0.31	0.72	0.31	0.70	0.36
Propane	0.20	0.09	0.20	0.09	0.20	0.10
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.98	0.42	0.98	0.42	0.80	0.41
Nitrogen	0.82	0.34	0.82	0.34	0.89	0.46
Helium	0.01	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.02
Ammonia	--	--	--	--	0.33	0.16
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	10.57	5.40
Water	--	57.38	--	57.80	--	48.69
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	653	--	753	--	565	--
Reactor Pressure, psig	50	--	50	--	1000	--
Product Water Rate, lb-mol/hr	0.006614	--	0.006663	--	0.004936	--
Product Gas Rate, SCF/hr	2.3705	--	2.3872	--	2.5227	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	0.000622	--
Product Gas Composition, mol %						
Carbon Monoxide	13.45	6.48	12.79	7.57	5.40	3.22
Carbon Dioxide	23.73	11.39	23.50	11.61	26.36	15.64
Hydrogen	38.28	18.48	39.19	18.89	37.24	22.09
Methane	21.95	10.55	21.92	10.52	19.50	11.57
Ethane	0.68	0.33	0.68	0.35	0.63	0.37
Propane	0.19	0.09	0.19	0.09	0.18	0.11
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.85	0.41	0.86	0.41	0.67	0.40
Nitrogen	0.78	0.37	0.78	0.37	0.79	0.47
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.04	0.02
Ammonia	--	--	--	--	0.22	0.13
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	8.93	5.14
Water	--	51.90	--	50.16	--	40.81
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000373	--	0.000408	--	0.000790	--
CO_2 Produced, lb-mol/hr	0.000366	--	0.000405	--	0.000787	--
H_2 Produced, lb-mol/hr	0.000365	--	0.000416	--	0.000792	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.37	--	0.41	--	0.79	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056k

Table B-4, Part 12. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	34		35		36	
Feed Water Rate, lb-mol/hr	0.007832		0.007982		0.003429	
Feed Gas Rate, SCF/hr	2.2146		2.2146		2.2197	
Feed Benzene Rate, lb-mol/hr	0.000679		0.000688		0.000678	
Feed H_2O/Gas Ratio (mol)	1.22		1.24		0.53	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.29	8.27	18.26	8.18	18.33	11.99
Carbon Dioxide	17.10	7.74	17.08	7.66	17.20	11.25
Hydrogen	29.22	13.20	29.17	13.06	29.26	19.12
Methane	21.69	9.81	21.65	9.70	21.73	14.21
Ethane	0.70	0.32	0.70	0.31	0.71	0.47
Propane	0.20	0.09	0.20	0.09	0.20	0.13
Butane	0.08	0.04	0.08	0.03	0.08	0.05
Hydrogen Sulfide	0.80	0.36	0.80	0.36	0.81	0.53
Nitrogen	0.90	0.41	0.89	0.40	0.90	0.59
Helium	0.02	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	0.36	0.17	0.40	0.19	0.20	0.12
Phenol	--	--	--	--	--	--
Benzene	10.59	4.76	10.71	4.77	10.52	6.87
Water	--	54.80	--	55.22	--	34.63
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	566	--	662	--	566	--
Reactor Pressure, psig	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.006560	--	0.006729	--	0.002229	--
Product Gas Rate, SCF/hr	2.5322	--	2.5515	--	2.5085	--
Product Benzene Rate, lb-mol/hr	0.000626	--	0.000623	--	0.000622	--
Product Gas Composition, mol %						
Carbon Monoxide	5.95	2.67	4.07	2.11	5.96	4.54
Carbon Dioxide	26.10	13.95	27.33	14.22	26.33	19.85
Hydrogen	37.39	19.60	37.95	19.73	36.92	28.15
Methane	19.47	10.23	19.21	10.00	19.59	14.95
Ethane	0.61	0.32	0.62	0.32	0.63	0.48
Propane	0.18	0.09	0.18	0.09	0.18	0.14
Butane	0.03	0.01	0.03	0.01	0.03	0.02
Hydrogen Sulfide	0.65	0.34	0.65	0.34	0.66	0.50
Nitrogen	0.81	0.42	0.79	0.41	0.81	0.62
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.02	0.04	0.02	0.04	0.03
Ammonia	0.29	0.15	0.28	0.15	0.09	0.07
Phenol	--	--	--	--	--	--
Benzene	8.47	4.55	8.84	4.46	8.75	6.64
Water	--	48.14	--	48.13	--	24.00
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000813	--	0.000885	--	0.000758	--
CO_2 Produced, lb-mol/hr	0.000816	--	0.000882	--	0.000749	--
H_2 Produced, lb-mol/hr	0.000814	--	0.000882	--	0.000749	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.81	--	0.88	--	0.76	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 13. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	37		38		39	
Feed Water Rate, lb-mol/hr	0.003429		0.003870		0.006124	
Feed Gas Rate, SCF/hr	2.2197		2.2197		2.2275	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000701		0.000678	
Feed H_2O/Gas Ratio (mol)	0.52		0.58		0.94	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.33	11.99	18.26	11.45	18.42	9.47
Carbon Dioxide	17.20	11.25	17.13	10.74	17.36	8.92
Hydrogen	29.26	19.12	29.19	18.26	28.66	14.74
Methane	21.73	14.21	21.65	13.57	21.97	11.30
Ethane	0.71	0.47	0.71	0.45	0.71	0.36
Propane	0.20	0.13	0.20	0.13	0.20	0.10
Butane	0.08	0.05	0.08	0.05	0.08	0.04
Hydrogen Sulfide	0.81	0.53	0.80	0.50	0.79	0.40
Nitrogen	0.90	0.59	0.90	0.56	0.96	0.49
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	0.20	0.12	0.21	0.13	0.32	0.17
Phenol	--	--	--	--	--	--
Benzene	10.52	6.87	10.81	6.78	10.47	5.38
Water	--	34.63	--	37.34	--	48.59
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	663	--	756	--	557	--
Reactor Pressure, psig	1000	--	1000	--	500	--
Product Water Rate, lb-mol/hr	0.002278	--	0.002694	--	0.005071	--
Product Gas Rate, SCF/hr	2.5464	--	2.5560	--	2.4804	--
Product Benzene Rate, lb-mol/hr	0.000627	--	0.000639	--	0.000616	--
Product Gas Composition, mol %						
Carbon Monoxide	4.74	3.60	4.41	3.22	7.57	4.44
Carbon Dioxide	26.91	20.49	27.12	19.74	25.31	14.63
Hydrogen	37.70	28.62	37.73	27.56	35.34	20.66
Methane	19.48	14.77	19.38	14.09	20.45	11.79
Ethane	0.64	0.48	0.63	0.46	0.65	0.38
Propane	0.18	0.14	0.18	0.13	0.20	0.12
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.65	0.49	0.65	0.47	0.68	0.40
Nitrogen	0.80	0.61	0.78	0.57	0.88	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.03	0.04	0.02
Ammonia	0.09	0.07	0.10	0.08	0.23	0.13
Phenol	--	--	--	--	--	--
Benzene	8.73	6.59	8.94	6.41	8.71	5.07
Water	--	24.08	--	27.21	--	41.72
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000840	--	0.000862	--	0.000656	--
CO_2 Produced, lb-mol/hr	0.000840	--	0.000858	--	0.000651	--
H_2 Produced, lb-mol/hr	0.000836	--	0.000860	--	0.000661	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.84	--	0.86	--	0.66	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056m

Table B-4, Part 14. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	40		41		42	
Feed Water Rate, lb-mol/hr	0.007839		0.007998		0.003478	
Feed Gas Rate, SCF/hr	2.2275		2.2275		2.2289	
Feed Benzene Rate, lb-mol/hr	0.000667		0.000678		0.000678	
Feed H_2O/Gas Ratio (mol)	1.21		1.23		0.54	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.44	8.34	18.40	8.24	18.44	11.99
Carbon Dioxide	17.37	7.86	17.34	7.77	17.37	11.30
Hydrogen	28.69	12.98	28.64	12.83	28.71	18.68
Methane	21.98	9.94	21.95	9.83	22.00	14.31
Ethane	0.71	0.32	0.71	0.32	0.71	0.46
Propane	0.20	0.09	0.20	0.09	0.20	0.13
Butane	0.08	0.03	0.08	0.03	0.08	0.05
Hydrogen Sulfide	0.79	0.36	0.79	0.35	0.79	0.51
Nitrogen	0.96	0.43	0.96	0.43	0.96	0.62
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	0.40	0.18	0.42	0.19	0.19	0.12
Phenol	--	--	--	--	--	--
Benzene	10.31	4.66	10.44	4.68	10.48	6.81
Water	--	54.78	--	55.21	--	34.98
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	560	--	663	--	558	--
Reactor Pressure, psig	500	--	500	--	500	--
Product Water Rate, lb-mol/hr	0.006736	--	0.006932	--	0.002303	--
Product Gas Rate, SCF/hr	2.4987	--	2.5173	--	2.4648	--
Product Benzene Rate, lb-mol/hr	0.000602	--	0.000616	--	0.000622	--
Product Gas Composition, mol %						
Carbon Monoxide	7.08	3.63	6.16	3.13	8.34	5.42
Carbon Dioxide	25.50	13.09	26.05	13.24	24.63	18.55
Hydrogen	35.84	18.40	36.28	18.45	35.09	26.43
Methane	20.37	10.36	19.97	10.15	20.39	15.36
Ethane	0.65	0.33	0.64	0.33	0.65	0.49
Propane	0.18	0.09	0.18	0.09	0.18	0.14
Butane	0.03	0.01	0.03	0.01	0.03	0.02
Hydrogen Sulfide	0.68	0.35	0.67	0.34	0.68	0.51
Nitrogen	0.87	0.45	0.86	0.44	0.88	0.66
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.02	0.04	0.02	0.04	0.03
Ammonia	0.28	0.14	0.29	0.15	0.10	0.08
Phenol	--	--	--	--	--	--
Benzene	8.47	4.35	8.82	4.37	8.98	6.66
Water	--	48.77	--	49.27	--	25.64
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000691	--	0.000752	--	0.000608	--
CO_2 Produced, lb-mol/hr	0.000688	--	0.000743	--	0.000606	--
H_2 Produced, lb-mol/hr	0.000690	--	0.000744	--	0.000607	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.69	--	0.75	--	0.61	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056n

Table B-4, Part 15. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	43		44		45	
Feed Water Rate, lb-mol/hr	0.003429		0.003393		0.008034	
Feed Gas Rate, SCF/hr	2.2289		2.2289		2.2244	
Feed Benzene Rate, lb-mol/hr	0.000661		0.000678		0.000678	
Feed H_2O/Gas Ratio (mol)	0.53		0.53		1.24	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.48	12.07	18.44	12.10	18.15	8.10
Carbon Dioxide	17.42	11.38	17.38	11.40	16.99	7.59
Hydrogen	28.78	18.00	28.71	18.84	28.86	13.33
Methane	22.06	14.41	22.01	14.44	21.31	9.51
Ethane	0.71	0.46	0.71	0.47	0.68	0.30
Propane	0.20	0.13	0.20	0.13	0.20	0.09
Butane	0.08	0.05	0.08	0.05	0.08	0.03
Hydrogen Sulfide	0.79	0.51	0.79	0.51	0.86	0.39
Nitrogen	0.96	0.63	0.96	0.63	0.86	0.39
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	0.19	0.12	0.19	0.12	0.42	0.19
Phenol	--	--	--	--	--	--
Benzene	10.26	6.68	10.46	6.87	10.52	4.67
Water	--	35.52	--	34.40	--	55.38
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	655	--	753	--	559	--
Reactor Pressure, psig	500	--	500	--	200	--
Product Water Rate, lb-mol/hr	0.002204	--	0.002303	--	0.006846	--
Product Gas Rate, SCF/hr	2.4920	--	2.5013	--	2.4324	--
Product Benzene Rate, lb-mol/hr	0.000588	--	0.000610	--	0.000613	--
Product Gas Composition, mol %						
Carbon Monoxide	7.28	5.55	6.71	5.07	9.09	4.63
Carbon Dioxide	25.48	19.42	25.76	19.46	23.56	12.04
Hydrogen	35.89	27.35	36.37	27.24	35.45	18.05
Methane	20.23	15.42	20.04	15.14	19.94	10.05
Ethane	0.67	0.51	0.65	0.49	0.64	0.32
Propane	0.20	0.15	0.18	0.14	0.18	0.09
Butane	0.03	0.02	0.03	0.02	0.03	0.01
Hydrogen Sulfide	0.69	0.53	0.66	0.50	0.75	0.37
Nitrogen	0.86	0.66	0.90	0.68	0.83	0.41
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.03	0.04	0.02
Ammonia	0.10	0.08	0.10	0.07	0.30	0.15
Phenol	--	--	--	--	--	--
Benzene	8.52	6.34	8.55	6.48	8.90	4.41
Water	--	23.93	--	24.67	--	49.44
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000680	--	0.000717	--	0.000542	--
CO_2 Produced, lb-mol/hr	0.000675	--	0.000707	--	0.000540	--
H_2 Produced, lb-mol/hr	0.000676	--	0.000706	--	0.000536	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.68	--	0.71	--	0.54	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B770100560

Table B-4, Part 16. KINETICS TESTS (Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	46		47		48	
Feed Water Rate, lb-mol/hr	0.007998		0.007973		0.006161	
Feed Gas Rate, SCF/hr	2.2244		2.2244		2.2206	
Feed Benzene Rate, lb-mol/hr	0.000670		0.000667		0.000678	
Feed H_2O/Gas Ratio (mol)	1.24		1.23		0.96	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.17	8.13	18.18	8.14	18.16	9.30
Carbon Dioxide	17.01	7.61	17.02	7.62	17.00	8.70
Hydrogen	29.90	13.37	29.91	13.38	29.90	15.31
Methane	21.34	9.54	21.35	9.55	21.32	10.91
Ethane	0.68	0.30	0.68	0.30	0.68	0.35
Propane	0.20	0.09	0.20	0.09	0.20	0.10
Butane	0.08	0.03	0.08	0.03	0.08	0.04
Hydrogen Sulfide	0.87	0.39	0.87	0.39	0.85	0.44
Nitrogen	0.87	0.39	0.87	0.39	0.76	0.44
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.02
Ammonia	0.42	0.19	0.42	0.19	0.32	0.17
Phenol	--	--	--	--	--	--
Benzene	10.39	4.63	10.35	4.62	10.56	5.37
Water	--	55.30	--	55.27	--	48.84
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	654	--	753	--	554	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.006944	--	0.006883	--	0.005022	--
Product Gas Rate, SCF/hr	2.4412	--	2.4500	--	2.4283	--
Product Benzene Rate, lb-mol/hr	0.000605	--	0.000599	--	0.000608	--
Product Gas Composition, mol %						
Carbon Monoxide	8.80	4.43	8.36	4.23	9.33	5.43
Carbon Dioxide	23.90	12.05	24.16	12.24	23.55	13.72
Hydrogen	35.84	18.08	36.05	18.26	35.53	20.67
Methane	19.95	10.06	19.86	10.06	20.06	11.69
Ethane	0.62	0.31	0.64	0.32	0.63	0.37
Propane	0.18	0.09	0.17	0.09	0.19	0.11
Butane	0.03	0.01	0.03	0.01	0.03	0.02
Hydrogen Sulfide	0.72	0.36	0.72	0.36	0.73	0.42
Nitrogen	0.83	0.41	0.83	0.42	0.83	0.48
Helium	0.02	0.01	0.02	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.02	0.04	0.02	0.04	0.02
Ammonia	0.30	0.15	0.30	0.15	0.21	0.12
Phenol	--	--	--	--	--	--
Benzene	8.77	4.32	8.82	4.29	8.86	5.06
Water	--	49.70	--	48.50	--	41.88
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000565	--	0.000589	--	0.000524	--
CO_2 Produced, lb-mol/hr	0.000561	--	0.000588	--	0.000521	--
H_2 Produced, lb-mol/hr	0.000550	--	0.000583	--	0.000517	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.56	--	0.59	--	0.52	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056p

Table B-4, Part 17. KINETICS TESTS (Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	49		50		51	
Feed Water Rate, lb-mol/hr	0.006075		0.006222		0.003429	
Feed Gas Rate, SCF/hr	2.2206		2.2206		2.2291	
Feed Benzene Rate, lb-mol/hr	0.000667		0.000678		0.000678	
Feed H_2O/Gas Ratio (mol)	0.95		0.95		0.53	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.19	9.37	18.16	9.25	18.20	11.90
Carbon Dioxide	17.03	8.77	17.00	8.66	17.04	11.14
Hydrogen	29.96	15.43	29.90	15.23	29.95	19.58
Methane	21.36	11.00	21.32	10.86	21.42	14.00
Ethane	0.68	0.35	0.68	0.35	0.69	0.45
Propane	0.20	0.10	0.20	0.10	0.20	0.13
Butane	0.08	0.04	0.08	0.04	0.08	0.05
Hydrogen Sulfide	0.85	0.44	0.85	0.43	0.85	0.56
Nitrogen	0.86	0.45	0.86	0.44	0.88	0.58
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	0.31	0.16	0.32	0.17	0.19	0.12
Phenol	--	--	--	--	--	--
Benzene	10.41	5.32	10.56	5.34	10.43	6.84
Water	--	48.54	--	49.10	--	34.61
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	655	--	754	--	556	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.004911	--	0.005120	--	0.002229	--
Product Gas Rate, SCF/hr	2.4283	--	2.4459	--	2.4123	--
Product Benzene Rate, lb-mol/hr	0.000591	--	0.000613	--	0.000611	--
Product Gas Composition, mol %						
Carbon Monoxide	9.12	5.36	8.60	4.98	10.37	7.85
Carbon Dioxide	23.75	13.95	24.05	13.93	22.99	17.41
Hydrogen	35.75	21.02	35.96	20.83	35.12	26.58
Methane	20.09	11.81	19.93	11.54	20.34	15.40
Ethane	0.63	0.37	0.62	0.36	0.65	0.49
Propane	0.19	0.11	0.18	0.11	0.19	0.14
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.73	0.43	0.71	0.41	0.73	0.56
Nitrogen	0.83	0.49	0.82	0.48	0.83	0.63
Helium	0.02	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.02	0.04	0.03
Ammonia	0.21	0.13	0.21	0.12	0.10	0.08
Phenol	--	--	--	--	--	--
Benzene	8.61	4.95	8.84	5.04	8.59	6.66
Water	--	41.32	--	42.15	--	24.14
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000542	--	0.000574	--	0.000472	--
CO_2 Produced, lb-mol/hr	0.000541	--	0.000567	--	0.000470	--
H_2 Produced, lb-mol/hr	0.000533	--	0.000573	--	0.000466	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.54	--	0.57	--	0.47	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B7/010 56q

Table B-4, Part 18. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	52		53		54	
Feed Water Rate, lb-mol/hr	0.003344		0.003331		0.006124	
Feed Gas Rate, SCF/hr	2.2291		2.2291		2.2192	
Feed Benzene Rate, lb-mol/hr	0.000670		0.000650		0.000689	
Feed H_2O/Gas Ratio (mol)	0.52		0.52		0.95	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.23	12.02	18.28	12.06	17.80	9.15
Carbon Dioxide	17.07	11.25	17.12	11.29	16.83	8.65
Hydrogen	29.99	19.77	30.09	19.84	30.59	15.72
Methane	21.44	14.14	21.51	14.18	21.14	10.86
Ethane	0.70	0.46	0.70	0.46	0.68	0.35
Propane	0.20	0.13	0.20	0.13	0.19	0.09
Butane	0.08	0.05	0.08	0.05	0.08	0.04
Hydrogen Sulfide	0.85	0.56	0.85	0.56	0.85	0.44
Nitrogen	0.88	0.58	0.88	0.58	0.13	0.43
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	0.17	0.11	0.17	0.11	0.32	0.17
Phenol	--	--	--	--	--	--
Benzene	10.32	6.83	10.05	6.65	10.62	5.47
Water	--	34.06	--	34.05	--	48.60
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	653	--	752	--	561	--
Reactor Pressure, psig	200	--	200	--	100	--
Product Water Rate, lb-mol/hr	0.002205	--	0.002217	--	0.005022	--
Product Gas Rate, SCF/hr	2.4296	--	2.4428	--	2.3429	--
Product Benzene Rate, lb-mol/hr	0.000605	--	0.000582	--	0.000622	--
Product Gas Composition, mol %						
Carbon Monoxide	9.54	7.26	9.03	5.86	12.35	7.07
Carbon Dioxide	23.45	17.83	23.94	18.19	20.93	11.97
Hydrogen	35.49	26.96	35.93	27.31	34.21	19.57
Methane	20.15	15.32	20.11	15.28	20.43	11.69
Ethane	0.64	0.49	0.65	0.48	0.64	0.37
Propane	0.19	0.14	0.19	0.14	0.18	0.10
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.73	0.55	0.73	0.55	0.77	0.44
Nitrogen	0.83	0.63	0.83	0.63	0.82	0.47
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.03	0.04	0.03
Ammonia	0.10	0.08	0.10	0.08	0.22	0.13
Phenol	--	--	--	--	--	--
Benzene	8.80	6.58	8.43	6.31	9.37	5.30
Water	--	24.10	--	24.11	--	42.83
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000519	--	0.000554	--	0.000322	--
CO_2 Produced, lb-mol/hr	0.000517	--	0.000551	--	0.000317	--
H_2 Produced, lb-mol/hr	0.000512	--	0.000548	--	0.000316	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.52	--	0.55	--	0.32	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056r

Table B-4, Part 19. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	55		56		57	
Feed Water Rate, lb-mol/hr	0.007496		0.007545		0.003258	
Feed Gas Rate, SCF/hr	2.2192		2.2192		2.2197	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000673		0.000669	
Feed H_2O/Gas Ratio (mol)	1.15		1.16		0.51	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.82	8.25	17.83	8.23	17.88	11.68
Carbon Dioxide	16.85	7.80	16.86	7.77	16.89	11.22
Hydrogen	30.63	14.18	30.65	14.14	30.74	20.41
Methane	21.16	9.80	21.16	9.77	21.24	14.10
Ethane	0.68	0.32	0.68	0.31	0.68	0.45
Propane	0.19	0.09	0.19	0.09	0.19	0.12
Butane	0.08	0.04	0.08	0.04	0.08	0.05
Hydrogen Sulfide	0.85	0.39	0.85	0.39	0.85	0.57
Nitrogen	0.83	0.39	0.83	0.39	0.84	0.56
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	0.38	0.18	0.38	0.18	0.17	0.11
Phenol	--	--	--	--	--	--
Benzene	10.46	4.86	10.42	4.81	10.37	6.90
Water	--	53.67	--	53.85	--	33.59
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	557	--	653	--	563	--
Reactor Pressure, psig	100	--	100	--	100	--
Product Water Rate, lb-mol/hr	0.006369	--	0.006418	--	0.002119	--
Product Gas Rate, SCF/hr	2.3511	--	2.3676	--	2.3188	--
Product Benzene Rate, lb-mol/hr	0.000625	--	0.000611	--	0.000605	--
Product Gas Composition, mol %						
Carbon Monoxide	11.94	6.14	11.21	5.76	13.36	10.12
Carbon Dioxide	21.16	10.89	21.74	11.16	20.37	15.44
Hydrogen	34.37	17.68	34.81	17.88	33.75	25.55
Methane	20.35	10.47	20.24	10.40	20.69	15.68
Ethane	0.65	0.35	0.65	0.33	0.66	0.50
Propane	0.18	0.09	0.18	0.09	0.18	0.14
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.76	0.39	0.75	0.39	0.75	0.57
Nitrogen	0.83	0.43	0.83	0.42	0.84	0.64
Helium	0.01	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.04	0.02	0.04	0.02	0.05	0.03
Ammonia	0.28	0.14	0.28	0.14	0.11	0.08
Phenol	--	--	--	--	--	--
Benzene	9.40	4.76	9.23	4.63	9.19	6.91
Water	--	48.61	--	48.75	--	24.31
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000346	--	0.000392	--	0.000266	--
CO_2 Produced, lb-mol/hr	0.000339	--	0.000384	--	0.000263	--
H_2 Produced, lb-mol/hr	0.000336	--	0.000379	--	0.000258	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.34	--	0.39	--	0.27	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056s

Table B-4, Part 20. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	58		59		60	
Feed Water Rate, lb-mol/hr	0.003429		0.003307		0.007937	
Feed Gas Rate, SCF/hr	2.2197		2.2197		2.2133	
Feed Benzene Rate, lb-mol/hr	0.000667		0.000673		0.000656	
Feed H_2O/Gas Ratio (mol)	0.53		0.51		1.23	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.88	11.67	17.86	11.67	17.73	7.93
Carbon Dioxide	16.89	11.02	16.88	11.02	16.80	7.52
Hydrogen	30.75	20.06	30.73	20.06	30.97	13.87
Methane	21.25	13.86	21.23	13.84	21.18	9.48
Ethane	0.68	0.45	0.68	0.45	0.68	0.31
Propane	0.19	0.12	0.19	0.12	0.19	0.08
Butane	0.08	0.05	0.08	0.05	0.08	0.03
Hydrogen Sulfide	0.85	0.56	0.85	0.56	0.86	0.38
Nitrogen	0.84	0.55	0.84	0.55	0.82	0.37
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	0.17	0.11	0.17	0.11	0.42	0.19
Phenol	--	--	--	--	--	--
Benzene	10.35	6.76	10.42	6.82	10.20	4.57
Water	--	34.75	--	34.71	--	55.54
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	656	--	753	--	561	--
Reactor Pressure, psig	100	--	100	--	50	--
Product Water Rate, lb-mol/hr	0.002327	--	0.002241	--	0.006785	--
Product Gas Rate, SCF/hr	2.3511	--	2.3676	--	2.3201	--
Product Benzene Rate, lb-mol/hr	0.000608	--	0.000611	--	0.000594	--
Product Gas Composition, mol %						
Carbon Monoxide	12.19	9.05	11.43	8.58	12.85	6.35
Carbon Dioxide	21.12	15.69	21.64	16.26	20.49	10.13
Hydrogen	34.35	25.50	34.77	26.12	34.33	16.88
Methane	20.48	15.21	20.33	15.27	20.56	10.17
Ethane	0.65	0.49	0.65	0.49	0.65	0.32
Propane	0.18	0.13	0.18	0.13	0.18	0.09
Butane	0.03	0.02	0.03	0.02	0.03	0.01
Hydrogen Sulfide	0.74	0.55	0.77	0.58	0.77	0.38
Nitrogen	0.82	0.61	0.80	0.60	0.81	0.40
Helium	0.02	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.03	0.05	0.02
Ammonia	0.10	0.08	0.10	0.08	0.33	0.15
Phenol	--	--	--	--	--	--
Benzene	9.28	6.72	9.25	6.78	8.93	4.42
Water	--	25.91	--	25.05	--	50.67
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000333	--	0.000379	--	0.000287	--
CO_2 Produced, lb-mol/hr	0.000331	--	0.000375	--	0.000280	--
H_2 Produced, lb-mol/hr	0.000324	--	0.000372	--	0.000274	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.33	--	0.38	--	0.29	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056t

Table B-4, Part 21. KINETICS TESTS (Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	61		62		63	
Feed Water Rate, lb-mol/hr	0.007912		0.007839		0.003576	
Feed Gas Rate, SCF/hr	2.2133		2.2133		2.2287	
Feed Benzene Rate, lb-mol/hr	0.000687		0.000667		0.000678	
Feed H_2O/Gas Ratio (mol)	1.22		1.23		0.55	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.64	7.93	17.70	7.98	17.71	11.41
Carbon Dioxide	16.72	7.52	16.77	7.56	16.80	10.82
Hydrogen	30.84	13.85	30.93	13.95	30.96	19.95
Methane	21.08	9.47	21.15	9.54	21.17	13.64
Ethane	0.68	0.31	0.68	0.31	0.68	0.44
Propane	0.19	0.08	0.19	0.08	0.19	0.12
Butane	0.08	0.03	0.08	0.04	0.08	0.05
Hydrogen Sulfide	0.85	0.38	0.85	0.39	0.86	0.56
Nitrogen	0.81	0.37	0.82	0.37	0.83	0.54
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	0.42	0.19	0.42	0.19	0.19	0.12
Phenol	--	--	--	--	--	--
Benzene	10.62	4.78	10.34	4.66	10.46	6.74
Water	--	55.06	--	54.90	--	35.57
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	657	--	752	--	562	--
Reactor Pressure, psig	50	--	50	--	50	--
Product Water Rate, lb-mol/hr	0.006724	--	0.006712	--	0.002376	--
Product Gas Rate, SCF/hr	2.3444	--	2.3526	--	2.3282	--
Product Benzene Rate, lb-mol/hr	0.000622	--	0.000605	--	0.000613	--
Product Gas Composition, mol %						
Carbon Monoxide	11.86	5.93	11.49	5.76	13.25	9.77
Carbon Dioxide	21.08	10.55	21.60	10.72	20.21	14.90
Hydrogen	34.58	17.40	34.88	17.56	33.91	25.00
Methane	20.27	10.14	20.26	10.14	20.60	15.19
Ethane	0.65	0.33	0.65	0.33	0.66	0.49
Propane	0.18	0.09	0.18	0.09	0.18	0.13
Butane	0.03	0.01	0.03	0.01	0.03	0.02
Hydrogen Sulfide	0.76	0.38	0.76	0.38	0.78	0.58
Nitrogen	0.82	0.41	0.82	0.41	0.84	0.62
Helium	0.01	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.04	0.02	0.04	0.02	0.05	0.03
Ammonia	0.33	0.16	0.33	0.16	0.12	0.09
Phenol	--	--	--	--	--	--
Benzene	9.40	4.62	8.95	4.50	9.35	6.78
Water	--	49.95	--	49.91	--	26.39
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000342	--	0.000366	--	0.000264	--
CO_2 Produced, lb-mol/hr	0.000339	--	0.000360	--	0.000259	--
H_2 Produced, lb-mol/hr	0.000335	--	0.000357	--	0.000255	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.34	--	0.36	--	0.26	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056C

Table B-4, Part 22. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	64		65		66	
Feed Water Rate, lb-mol/hr	0.003417		0.003442		0.006124	
Feed Gas Rate, SCF/hr	2.2287		2.2287		2.2405	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000678		--	
Feed H_2O/Gas Ratio (mol)	0.54		0.54		1.05	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.71	11.61	17.71	11.56	19.84	9.66
Carbon Dioxide	16.80	11.01	16.80	10.97	18.80	9.15
Hydrogen	30.96	20.29	30.96	20.22	34.66	16.88
Methane	21.17	13.87	21.17	13.82	23.70	11.54
Ethane	0.68	0.45	0.68	0.44	0.76	0.37
Propane	0.19	0.12	0.19	0.12	0.21	0.10
Butane	0.08	0.05	0.08	0.05	0.08	0.04
Hydrogen Sulfide	0.86	0.57	0.86	0.56	0.96	0.47
Nitrogen	0.83	0.55	0.83	0.54	0.93	0.45
Helium	0.02	0.01	0.02	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	0.19	0.12	0.19	0.12	--	--
Phenol	--	--	--	--	--	--
Benzene	10.46	6.86	10.46	6.84	--	--
Water	--	34.46	--	34.72	--	51.30
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	655	--	752	--	556	--
Reactor Pressure, psig	50	--	50	--	50	--
Product Water Rate, lb-mol/hr	0.002156	--	0.002254	--	0.004889	--
Product Gas Rate, SCF/hr	2.3444	--	2.3525	--	2.3487	--
Product Benzene Rate, lb-mol/hr	0.000627	--	0.000616	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	12.75	9.58	12.27	9.19	14.18	7.87
Carbon Dioxide	20.78	15.58	20.84	15.65	22.58	12.52
Hydrogen	34.18	25.88	34.47	25.82	37.73	20.86
Methane	20.24	15.48	20.41	15.29	22.73	12.55
Ethane	0.65	0.50	0.65	0.49	0.72	0.40
Propane	0.18	0.14	0.18	0.13	0.20	0.11
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.77	0.59	0.77	0.58	0.86	0.47
Nitrogen	0.82	0.62	0.82	0.61	0.91	0.50
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.03	0.05	0.03
Ammonia	0.12	0.09	0.12	0.09	--	--
Phenol	--	--	--	--	--	--
Benzene	9.43	7.06	9.34	6.86	--	--
Water	--	24.42	--	25.23	--	44.66
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000297	--	0.000321	--	0.000289	--
CO_2 Produced, lb-mol/hr	0.000295	--	0.000318	--	0.000284	--
H_2 Produced, lb-mol/hr	0.000292	--	0.000315	--	0.000278	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.30	--	0.32	--	0.29	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 23. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	67		68		69	
Feed Water Rate, lb-mol/hr	0.006105		0.006124		0.003576	
Feed Gas Rate, SCF/hr	2.2405		2.2405		2.2359	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.04		1.05		0.61	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.84	9.67	19.84	9.69	19.84	12.28
Carbon Dioxide	18.80	9.16	18.80	9.17	18.80	11.63
Hydrogen	34.66	16.91	34.66	16.88	34.66	21.44
Methane	23.70	11.57	23.70	11.59	23.70	14.66
Ethane	0.76	0.37	0.76	0.37	0.76	0.47
Propane	0.21	0.10	0.21	0.10	0.21	0.13
Butane	0.08	0.04	0.08	0.04	0.08	0.05
Hydrogen Sulfide	0.96	0.47	0.96	0.48	0.96	0.60
Nitrogen	0.93	0.45	0.93	0.45	0.93	0.58
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	51.22	--	51.19	--	38.12
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	656	--	753	--	553	--
Reactor Pressure, psig	50	--	50	--	50	--
Product Water Rate, lb-mol/hr	0.004936	--	0.005022	--	0.002376	--
Product Gas Rate, SCF/hr	2.3650	--	2.3815	--	2.3337	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	13.54	7.50	12.90	7.12	14.61	10.49
Carbon Dioxide	23.00	12.20	23.46	12.95	22.28	16.01
Hydrogen	38.18	21.05	38.42	21.15	37.59	26.86
Methane	22.52	12.48	22.47	12.34	22.73	16.31
Ethane	0.72	0.40	0.72	0.40	0.73	0.52
Propane	0.20	0.11	0.20	0.11	0.20	0.14
Butane	0.03	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.85	0.47	0.85	0.46	0.86	0.62
Nitrogen	0.90	0.50	0.89	0.49	0.91	0.65
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	45.23	--	44.92	--	28.34
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000323	--	0.000356	--	0.000266	--
CO_2 Produced, lb-mol/hr	0.000319	--	0.000358	--	0.000260	--
H_2 Produced, lb-mol/hr	0.000316	--	0.000354	--	0.000255	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.32	--	0.36	--	0.26	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056w

Table B-4, Part 24. KINETICS TESTS (Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	70		71		72	
Feed Water Rate, lb-mol/hr	0.003515		0.003429		0.003429	
Feed Gas Rate, SCF/hr	2.2339		2.2339		2.2051	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	0.59		0.58		0.57	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.84	12.36	19.84	12.47	11.45	7.17
Carbon Dioxide	18.80	11.70	18.80	11.81	11.00	6.88
Hydrogen	34.66	21.58	34.66	21.78	22.20	13.88
Methane	23.70	14.75	23.70	14.89	53.23	33.29
Ethane	0.76	0.47	0.76	0.48	0.45	0.28
Propane	0.21	0.13	0.21	0.13	0.13	0.08
Butane	0.08	0.05	0.08	0.05	0.05	0.03
Hydrogen Sulfide	0.96	0.60	0.96	0.61	0.90	0.57
Nitrogen	0.93	0.58	0.93	0.59	0.53	0.33
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	37.74	--	37.15	--	--
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	654	--	753	--	561	--
Reactor Pressure, psig	50	--	50	--	500	--
Product Water Rate, lb-mol/hr	0.002241	--	0.002217	--	0.002278	--
Product Gas Rate, SCF/hr	2.3498	--	2.3662	--	2.3362	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	13.74	10.05	13.11	9.63	5.07	3.68
Carbon Dioxide	22.87	16.72	23.31	17.13	16.03	11.65
Hydrogen	37.97	27.79	38.40	28.09	26.56	19.31
Methane	22.66	16.58	22.42	16.47	50.42	36.67
Ethane	0.72	0.53	0.72	0.53	0.42	0.30
Propane	0.20	0.14	0.20	0.14	0.12	0.08
Butane	0.03	0.02	0.03	0.02	0.02	0.01
Hydrogen Sulfide	0.85	0.62	0.85	0.62	0.80	0.59
Nitrogen	0.90	0.65	0.90	0.65	0.50	0.36
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.04	0.05	0.04
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	26.86	--	26.67	--	27.30
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000313	--	0.000346	--	0.000349	--
CO_2 Produced, lb-mol/hr	0.000305	--	0.000342	--	0.000342	--
H_2 Produced, lb-mol/hr	0.000300	--	0.000338	--	0.000340	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.31	--	0.34	--	0.35	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77010056x

Table B-4, Part 25. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	73		74		75	
Feed Water Rate, lb-mol/hr	0.003503		0.003429		0.007936	
Feed Gas Rate, SCF/hr	2.2051		2.2051		2.2168	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	0.61		0.60		1.37	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	11.45	7.11	11.45	7.17	11.16	4.69
Carbon Dioxide	11.00	6.83	11.00	6.88	10.85	4.45
Hydrogen	22.20	13.77	22.20	13.88	22.30	9.37
Methane	53.23	33.02	53.23	33.29	53.55	22.61
Ethane	0.45	0.28	0.45	0.28	0.45	0.19
Propane	0.13	0.08	0.13	0.08	0.13	0.05
Butane	0.05	0.03	0.05	0.03	0.05	0.02
Hydrogen Sulfide	0.90	0.56	0.90	0.57	0.91	0.38
Nitrogen	0.53	0.33	0.53	0.33	0.54	0.22
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	37.95	--	37.45	--	57.99
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	657	--	758	--	559	--
Reactor Pressure, psig	500	--	500	--	200	--
Product Water Rate, lb-mol/hr	0.002254	--	0.002303	--	0.006785	--
Product Gas Rate, SCF/hr	2.3610	--	2.3694	--	2.3400	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	4.18	3.05	3.84	2.79	5.39	2.50
Carbon Dioxide	16.81	12.22	17.05	12.41	14.69	6.84
Hydrogen	27.21	19.91	27.36	19.93	26.63	12.44
Methane	49.87	36.50	49.82	36.20	51.35	24.02
Ethane	0.42	0.31	0.42	0.31	0.43	0.19
Propane	0.12	0.08	0.12	0.08	0.12	0.05
Butane	0.02	0.01	0.02	0.01	0.02	0.01
Hydrogen Sulfide	0.81	0.57	0.81	0.57	0.81	0.37
Nitrogen	0.50	0.36	0.50	0.35	0.50	0.23
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.04	0.05	0.04	0.05	0.02
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	26.94	--	27.30	--	53.32
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000400	--	0.000420	--	0.000321	--
CO_2 Produced, lb-mol/hr	0.000394	--	0.000419	--	0.000271	--
H_2 Produced, lb-mol/hr	0.000390	--	0.000414	--	0.000317	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.40	--	0.42	--	0.32	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77030681a

Table B-4, Part 26. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	76		77		78	
Feed Water Rate, lb-mol/hr	0.007594		0.007790		0.006124	
Feed Gas Rate, SCF/hr	2.2168		2.2168		2.2289	
Feed Benzene Rate, lb-mol/hr	--		--		--	
Feed H_2O/Gas Ratio (mol)	1.32		1.34		1.05	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	11.16	4.81	11.16	4.74	11.16	5.42
Carbon Dioxide	10.85	4.56	10.85	4.50	10.85	5.27
Hydrogen	22.30	9.61	22.30	9.47	22.30	10.83
Methane	53.55	23.09	53.55	22.75	53.55	26.01
Ethane	0.45	0.19	0.45	0.19	0.45	0.22
Propane	0.13	0.05	0.13	0.05	0.13	0.06
Butane	0.05	0.02	0.05	0.02	0.05	0.03
Hydrogen Sulfide	0.91	0.39	0.91	0.38	0.91	0.44
Nitrogen	0.54	0.22	0.54	0.22	0.54	0.26
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	57.03	--	57.65	--	51.42
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	658	--	757	--	558	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.006491	--	0.006650	--	0.005071	--
Product Gas Rate, SCF/hr	2.3482	--	2.3564	--	2.3532	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	--	--
Product Gas Composition, mol %						
Carbon Monoxide	4.96	2.40	4.62	2.20	5.39	2.94
Carbon Dioxide	15.77	7.63	16.00	7.67	15.46	8.39
Hydrogen	26.56	12.85	26.65	12.83	26.26	14.35
Methane	50.78	24.54	50.30	24.21	50.96	27.77
Ethane	0.42	0.21	0.42	0.20	0.42	0.23
Propane	0.12	0.06	0.12	0.05	0.12	0.06
Butane	0.02	0.01	0.02	0.01	0.02	0.01
Hydrogen Sulfide	0.81	0.38	0.81	0.38	0.81	0.43
Nitrogen	0.50	0.24	0.50	0.23	0.50	0.28
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	--	--	--	--	--	--
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	--	--
Water	--	51.65	--	52.19	--	45.50
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000340	--	0.000360	--	0.000317	--
CO_2 Produced, lb-mol/hr	0.000352	--	0.000370	--	0.000310	--
H_2 Produced, lb-mol/hr	0.000334	--	0.000355	--	0.000314	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.34	--	0.36	--	0.32	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77030681b

Table B-4, Part 27. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	79		80		81	
Feed Water Rate, lb-mol/hr	0.006161		0.006150		0.003393	
Feed Gas Rate, SCF/hr	2.2289		2.2289		2.2322	
Feed Benzene Rate, lb-mol/hr	--		--		0.000670	
Feed H_2O/Gas Ratio (mol)	1.06		1.06		0.52	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	11.16	5.41	11.16	5.41	10.11	6.64
Carbon Dioxide	10.85	5.25	10.85	5.26	9.93	6.51
Hydrogen	22.30	10.78	22.30	10.81	19.90	13.06
Methane	53.55	25.94	53.55	25.96	47.63	31.26
Ethane	0.45	0.22	0.45	0.22	0.40	0.26
Propane	0.13	0.06	0.13	0.06	0.11	0.07
Butane	0.05	0.03	0.05	0.03	0.05	0.03
Hydrogen Sulfide	0.91	0.44	0.91	0.44	0.80	0.53
Nitrogen	0.54	0.26	0.54	0.26	0.46	0.30
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	--	--	--	--	0.19	0.12
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	10.36	6.79
Water	--	51.57	--	51.51	--	34.39
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	654	--	756	--	555	--
Reactor Pressure, psig	200	--	200	--	500	--
Product Water Rate, lb-mol/hr	0.005034	--	0.005071	--	0.002119	--
Product Gas Rate, SCF/hr	2.3614	--	2.3697	--	2.3563	--
Product Benzene Rate, lb-mol/hr	--	--	--	--	0.000611	--
Product Gas Composition, mol %						
Carbon Monoxide	5.07	2.79	4.73	2.59	4.86	3.69
Carbon Dioxide	15.69	8.62	15.92	8.72	14.36	10.92
Hydrogen	26.58	14.59	26.85	14.67	23.89	18.27
Methane	50.73	27.79	50.57	27.68	45.96	34.89
Ethane	0.42	0.23	0.42	0.23	0.39	0.29
Propane	0.12	0.06	0.12	0.06	0.10	0.08
Butane	0.02	0.01	0.02	0.01	0.01	0.01
Hydrogen Sulfide	0.81	0.43	0.81	0.44	0.73	0.55
Nitrogen	0.50	0.28	0.50	0.28	0.45	0.34
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.04	0.03
Ammonia	--	--	--	--	0.10	0.08
Phenol	--	--	--	--	--	--
Benzene	--	--	--	--	9.10	6.90
Water	--	45.16	--	45.28	--	23.94
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000335	--	0.000355	--	0.000328	--
CO_2 Produced, lb-mol/hr	0.000334	--	0.000351	--	0.000324	--
H_2 Produced, lb-mol/hr	0.000339	--	0.000356	--	0.000320	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.34	--	0.36	--	0.33	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77030681c

Table B-4, Part 28. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	82		83		84	
Feed Water Rate, lb-mol/hr	0.003515		0.003380		0.007937	
Feed Gas Rate, SCF/hr	2.2322		2.2322		2.2270	
Feed Benzene Rate, lb-mol/hr	0.000670		0.000678		0.000667	
Feed H_2O/Gas Ratio (mol)	0.53		0.52		1.22	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	10.11	6.56	10.10	6.64	9.91	4.45
Carbon Dioxide	9.93	6.43	9.92	6.52	9.73	4.37
Hydrogen	19.90	12.89	19.88	13.07	19.76	8.88
Methane	47.63	30.87	47.57	31.27	47.94	21.54
Ethane	0.40	0.26	0.40	0.26	0.40	0.18
Propane	0.11	0.07	0.11	0.07	0.11	0.05
Butane	0.05	0.03	0.05	0.03	0.05	0.02
Hydrogen Sulfide	0.80	0.52	0.80	0.53	0.82	0.37
Nitrogen	0.46	0.30	0.46	0.30	0.48	0.22
Helium	0.01	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	0.19	0.12	0.19	0.12	0.43	0.19
Phenol	--	--	--	--	--	--
Benzene	10.36	6.70	10.45	6.87	10.30	4.63
Water	--	35.21	--	34.28	--	55.07
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	654	--	753	--	556	--
Reactor Pressure, psig	500	--	500	--	200	--
Product Water Rate, lb-mol/hr	0.002303	--	0.002107	--	0.006810	--
Product Gas Rate, SCF/hr	2.3727	--	2.3811	--	2.3349	--
Product Benzene Rate, lb-mol/hr	0.000611	--	0.000610	--	0.000610	--
Product Gas Composition, mol %						
Carbon Monoxide	4.34	3.24	3.94	3.01	5.36	2.66
Carbon Dioxide	14.75	11.01	15.08	11.51	13.55	6.72
Hydrogen	24.30	18.14	24.60	18.78	23.28	11.54
Methane	45.75	34.07	45.64	34.69	46.48	23.03
Ethane	0.38	0.29	0.38	0.29	0.39	0.19
Propane	0.10	0.08	0.10	0.08	0.10	0.05
Butane	0.01	0.01	0.01	0.01	0.02	0.01
Hydrogen Sulfide	0.72	0.54	0.72	0.55	0.73	0.36
Nitrogen	0.44	0.33	0.44	0.34	0.46	0.23
Helium	0.01	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.03	0.04	0.02
Ammonia	0.10	0.08	0.10	0.08	0.33	0.16
Phenol	--	--	--	--	--	--
Benzene	9.06	6.73	8.94	6.85	9.24	4.52
Water	--	25.44	--	23.77	--	50.50
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000361	--	0.000387	--	0.000283	--
CO_2 Produced, lb-mol/hr	0.000357	--	0.000382	--	0.000277	--
H_2 Produced, lb-mol/hr	0.000358	--	0.000383	--	0.000278	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.36	--	0.39	--	0.28	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 29. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	85		86		87	
Feed Water Rate, lb-mol/hr	0.007973		0.007973		0.005585	
Feed Gas Rate, SCF/hr	2.2270		2.2270		2.2192	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000678		0.000678	
Feed H_2O/Gas Ratio (mol)	1.23		1.23		0.88	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	9.90	4.44	9.90	4.44	9.89	5.31
Carbon Dioxide	9.71	4.36	9.71	4.36	9.72	5.21
Hydrogen	19.73	8.85	19.75	8.86	19.75	10.59
Methane	47.86	21.47	47.86	21.47	47.90	25.69
Ethane	0.40	0.18	0.40	0.18	0.40	0.22
Propane	0.11	0.05	0.12	0.06	0.12	0.07
Butane	0.05	0.02	0.05	0.02	0.05	0.03
Hydrogen Sulfide	0.82	0.37	0.82	0.37	0.82	0.44
Nitrogen	0.48	0.21	0.48	0.21	0.48	0.26
Helium	0.02	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	0.43	0.19	0.43	0.19	0.31	0.17
Phenol	--	--	--	--	--	--
Benzene	10.44	4.69	10.42	4.69	10.50	5.63
Water	--	55.14	--	55.12	--	46.34
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	655	--	754	--	555	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.006895	--	0.006859	--	0.004483	--
Product Gas Rate, SCF/hr	2.3430	--	2.3511	--	2.3267	--
Product Benzene Rate, lb-mol/hr	0.000613	--	0.000625	--	0.000616	--
Product Gas Composition, mol %						
Carbon Monoxide	4.96	2.45	4.75	2.36	5.47	3.27
Carbon Dioxide	13.93	6.88	14.04	6.97	12.62	7.55
Hydrogen	23.55	11.62	23.64	11.73	23.16	13.75
Methane	46.28	22.84	46.14	22.84	47.50	27.61
Ethane	0.39	0.19	0.39	0.19	0.39	0.23
Propane	0.10	0.05	0.12	0.06	0.12	0.07
Butane	0.02	0.01	0.01	0.01	0.01	0.01
Hydrogen Sulfide	0.73	0.36	0.74	0.37	0.75	0.45
Nitrogen	0.46	0.23	0.48	0.24	0.48	0.29
Helium	0.02	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.02	0.04	0.02	0.04	0.03
Ammonia	0.32	0.16	0.32	0.16	0.22	0.13
Phenol	--	--	--	--	--	--
Benzene	9.20	4.50	9.32	4.59	9.23	5.52
Water	--	50.68	--	50.45	--	41.08
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000309	--	0.000321	--	0.000274	--
CO_2 Produced, lb-mol/hr	0.000306	--	0.000318	--	0.000270	--
H_2 Produced, lb-mol/hr	0.000302	--	0.000315	--	0.000269	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.31	--	0.37	--	0.27	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B77030681e

Table B-4, Part 30. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	88		89		90	
Feed Water Rate, lb-mol/hr	0.006063		0.006173		0.003466	
Feed Gas Rate, SCF/hr	2.2192		2.2192		2.2275	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000678		0.000687	
Feed H_2O/Gas Ratio (mol)	0.95		0.97		0.53	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	9.89	5.10	9.89	5.06	10.00	6.51
Carbon Dioxide	9.72	5.01	9.72	4.97	9.78	6.37
Hydrogen	19.75	10.19	19.75	10.10	19.84	12.93
Methane	47.89	24.71	47.89	24.49	47.72	31.09
Ethane	0.40	0.21	0.40	0.21	0.40	0.26
Propane	0.12	0.06	0.12	0.06	0.12	0.08
Butane	0.05	0.02	0.05	0.02	0.05	0.03
Hydrogen Sulfide	0.82	0.42	0.82	0.42	0.79	0.51
Nitrogen	0.48	0.25	0.48	0.25	0.48	0.31
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.05	0.03
Ammonia	0.33	0.17	0.34	0.17	0.19	0.12
Phenol	--	--	--	--	--	--
Benzene	10.48	5.41	10.47	5.37	10.56	6.90
Water	--	48.42	--	48.85	--	34.85
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	654	--	753	--	558	--
Reactor Pressure, psig	200	--	200	--	100	--
Product Water Rate, lb-mol/hr	0.004924	--	0.005046	--	0.002266	--
Product Gas Rate, SCF/hr	2.3348	--	2.3429	--	2.2800	--
Product Benzene Rate, lb-mol/hr	0.000617	--	0.000622	--	0.000630	--
Product Gas Composition, mol %						
Carbon Monoxide	5.00	2.88	4.86	2.78	7.70	5.72
Carbon Dioxide	14.63	8.43	13.99	7.99	11.73	8.72
Hydrogen	23.48	13.53	23.60	13.48	21.67	16.11
Methane	45.58	26.66	46.27	26.37	47.13	35.12
Ethane	0.39	0.22	0.39	0.22	0.40	0.29
Propane	0.12	0.07	0.12	0.07	0.12	0.09
Butane	0.02	0.01	0.01	0.01	0.02	0.01
Hydrogen Sulfide	0.75	0.43	0.74	0.42	0.75	0.56
Nitrogen	0.48	0.28	0.48	0.27	0.49	0.36
Helium	0.02	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.04	0.03	0.04	0.03	0.05	0.03
Ammonia	0.24	0.14	0.25	0.14	0.11	0.08
Phenol	--	--	--	--	--	--
Benzene	9.25	5.31	9.24	5.29	9.61	7.14
Water	--	42.00	--	42.92	--	25.76
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000304	--	0.000312	--	0.000143	--
CO_2 Produced, lb-mol/hr	0.000301	--	0.000312	--	0.000135	--
H_2 Produced, lb-mol/hr	0.000296	--	0.000310	--	0.000135	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.30	--	0.31	--	0.14	--

Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

B770306811

Table B-4, Part 31. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	91		92		93	
Feed Water Rate, lb-mol/hr	0.003466		0.003478		0.007839	
Feed Gas Rate, SCF/hr	2.2275		2.2275		2.2218	
Feed Benzene Rate, lb-mol/hr	0.000687		0.000678		0.000667	
Feed H_2O/Gas Ratio (mol)	0.53		0.54		1.21	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	10.00	6.51	10.01	6.51	10.04	4.54
Carbon Dioxide	9.78	6.37	9.79	6.37	9.81	4.43
Hydrogen	19.84	12.93	19.87	12.92	19.89	8.98
Methane	47.72	31.30	47.78	31.08	47.63	21.50
Ethane	0.40	0.26	0.40	0.26	0.40	0.18
Propane	0.12	0.08	0.12	0.08	0.12	0.06
Butane	0.05	0.03	0.05	0.03	0.05	0.03
Hydrogen Sulfide	0.79	0.51	0.79	0.51	0.79	0.36
Nitrogen	0.48	0.31	0.48	0.31	0.48	0.22
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.03
Ammonia	0.19	0.12	0.19	0.12	0.42	0.19
Phenol	--	--	--	--	--	--
Benzene	10.54	6.91	10.45	6.82	10.30	4.66
Water	--	34.83	--	34.95	--	54.81
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	653	--	753	--	556	--
Reactor Pressure, psig	100	--	100	--	50	--
Product Water Rate, lb-mol/hr	0.002241	--	0.002303	--	0.006761	--
Product Gas Rate, SCF/hr	2.2955	--	2.3111	--	2.2820	--
Product Benzene Rate, lb-mol/hr	0.000622	--	0.000616	--	0.000605	--
Product Gas Composition, mol %						
Carbon Monoxide	7.06	5.27	6.45	4.78	7.63	3.76
Carbon Dioxide	12.26	9.15	12.83	9.52	11.89	5.85
Hydrogen	22.29	16.56	22.68	16.83	21.86	10.76
Methane	47.02	35.02	46.79	34.72	47.13	23.19
Ethane	0.39	0.29	0.39	0.29	0.40	0.20
Propane	0.12	0.09	0.12	0.09	0.12	0.06
Butane	0.02	0.01	0.02	0.01	0.02	0.01
Hydrogen Sulfide	0.74	0.55	0.74	0.55	0.74	0.37
Nitrogen	0.49	0.36	0.48	0.36	0.48	0.24
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.03	0.05	0.03	0.05	0.02
Ammonia	0.11	0.08	0.11	0.08	0.32	0.16
Phenol	--	--	--	--	--	--
Benzene	9.43	7.04	9.32	6.90	9.34	4.55
Water	--	25.47	--	25.83	--	50.82
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000183	--	0.000221	--	0.000149	--
CO_2 Produced, lb-mol/hr	0.000174	--	0.000216	--	0.000145	--
H_2 Produced, lb-mol/hr	0.000176	--	0.000216	--	0.000147	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.18	--	0.22	--	0.15	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 1.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 32. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	94		95		96	
Feed Water Rate, lb-mol/hr	0.007899		0.007937		0.007973	
Feed Gas Rate, SCF/hr	2.2218		2.2218		2.2301	
Feed Benzene Rate, lb-mol/hr	0.000670		0.000690		0.000678	
Feed H_2O/Gas Ratio (mol)	1.22		1.22		1.23	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	10.04	4.52	10.01	4.50	18.09	8.04
Carbon Dioxide	9.81	4.41	9.77	4.40	14.32	6.37
Hydrogen	19.84	8.95	19.81	8.91	22.37	9.95
Methane	47.61	21.43	47.45	21.34	31.42	14.15
Ethane	0.40	0.18	0.40	0.18	0.99	0.44
Propane	0.12	0.06	0.12	0.06	0.25	0.11
Butane	0.05	0.02	0.05	0.02	0.08	0.03
Hydrogen Sulfide	0.79	0.36	0.79	0.35	0.45	0.20
Nitrogen	0.48	0.22	0.48	0.22	1.07	0.47
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.03	0.01
Ammonia	0.42	0.19	0.43	0.19	0.40	0.19
Phenol	--	--	--	--	0.09	0.04
Benzene	10.37	4.66	10.62	4.78	10.42	4.62
Water	--	54.97	--	55.02	--	55.37
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	656	--	754	--	556	--
Reactor Pressure, psig	50	--	50	--	500	--
Product Water Rate, lb-mol/hr	0.006810	--	0.006785	--	0.006822	--
Product Gas Rate, SCF/hr	2.2976	--	2.3055	--	2.4843	--
Product Benzene Rate, lb-mol/hr	0.000605	--	0.000627	--	0.000616	--
Product Gas Composition, mol %						
Carbon Monoxide	7.01	3.45	6.66	3.29	7.30	3.72
Carbon Dioxide	12.41	6.10	12.63	6.24	22.41	11.40
Hydrogen	22.28	10.93	22.46	11.10	29.64	15.08
Methane	46.87	23.04	46.55	23.01	29.23	14.87
Ethane	0.39	0.19	0.39	0.19	0.91	0.46
Propane	0.12	0.06	0.12	0.06	0.23	0.12
Butane	0.02	0.01	0.02	0.01	0.04	0.02
Hydrogen Sulfide	0.74	0.37	0.74	0.37	0.41	0.21
Nitrogen	0.48	0.24	0.48	0.24	0.99	0.50
Helium	0.02	0.01	0.02	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.05	0.02	0.03	0.01
Ammonia	0.33	0.16	0.32	0.16	0.31	0.16
Phenol	--	--	--	--	0.06	0.03
Benzene	9.28	4.51	9.56	4.67	8.43	4.41
Water	--	50.91	--	50.63	--	49.00
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000187	--	0.000207	--	0.000654	--
CO_2 Produced, lb-mol/hr	0.000184	--	0.000204	--	0.000657	--
H_2 Produced, lb-mol/hr	0.000184	--	0.000205	--	0.000647	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.19	--	0.21	--	0.65	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 33. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	97		98		99	
Feed Water Rate, lb-mol/hr	0.007875		0.007985		0.007937	
Feed Gas Rate, SCF/hr	2.2301		2.2301		2.2360	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000678		0.000690	
Feed H_2O/Gas Ratio (mol)	1.21		1.23		1.22	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.02	8.15	18.12	8.09	17.48	7.89
Carbon Dioxide	14.27	6.46	14.36	6.41	14.06	6.35
Hydrogen	22.28	10.09	22.29	10.01	24.21	10.93
Methane	31.69	14.35	31.50	14.24	30.30	13.68
Ethane	0.99	0.45	0.99	0.44	0.97	0.43
Propane	0.25	0.11	0.25	0.11	0.25	0.11
Butane	0.08	0.03	0.08	0.03	0.08	0.03
Hydrogen Sulfide	0.45	0.20	0.45	0.20	0.54	0.24
Nitrogen	1.06	0.48	1.06	0.48	1.07	0.48
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.42	0.19	0.40	0.18	0.40	0.18
Phenol	0.09	0.04	0.09	0.04	0.09	0.04
Benzene	10.35	4.68	10.36	4.65	10.30	4.74
Water	--	54.75	--	55.10	--	54.88
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	654	--	753	--	556	--
Reactor Pressure, psig	500	--	500	--	200	--
Product Water Rate, lb-mol/hr	0.006699	--	0.006724	--	0.006810	--
Product Gas Rate, SCF/hr	2.5120	--	2.5213	--	2.4371	--
Product Benzene Rate, lb-mol/hr	0.000616	--	0.000616	--	0.000627	--
Product Gas Composition, mol %						
Carbon Monoxide	6.22	3.22	5.71	2.95	9.00	4.56
Carbon Dioxide	23.10	11.95	23.44	12.12	20.50	10.39
Hydrogen	30.27	15.66	30.60	15.83	29.95	15.18
Methane	28.91	14.93	28.72	14.85	28.55	14.42
Ethane	0.89	0.46	0.88	0.45	0.90	0.46
Propane	0.22	0.12	0.22	0.12	0.23	0.12
Butane	0.04	0.02	0.04	0.02	0.04	0.02
Hydrogen Sulfide	0.41	0.21	0.40	0.21	0.50	0.25
Nitrogen	0.98	0.51	0.97	0.50	1.00	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.31	0.16	0.31	0.16	0.32	0.16
Phenol	0.06	0.03	0.06	0.03	0.06	0.03
Benzene	8.55	4.42	8.61	4.41	8.91	4.53
Water	--	48.29	--	48.33	--	49.35
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000725	--	0.000760	--	0.000512	--
CO_2 Produced, lb-mol/hr	0.000728	--	0.000758	--	0.000513	--
H_2 Produced, lb-mol/hr	0.000720	--	0.000751	--	0.000510	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.73	--	0.76	--	0.51	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 1.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 34. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	100		101		102	
Feed Water Rate, lb-mol/hr	0.007961		0.007838		0.003478	
Feed Gas Rate, SCF/hr	2.2360		2.2360		2.2194	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000701		0.000690	
Feed H_2O/Gas Ratio (mol)	1.22		1.20		0.53	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.51	7.89	17.45	7.95	17.51	11.40
Carbon Dioxide	14.09	6.35	14.04	6.39	14.08	9.16
Hydrogen	24.25	10.93	24.17	11.00	24.24	15.78
Methane	30.35	13.68	30.25	13.77	30.33	19.75
Ethane	0.97	0.44	0.96	0.44	0.97	0.63
Propane	0.25	0.11	0.24	0.11	0.25	0.16
Butane	0.08	0.03	0.08	0.03	0.08	0.05
Hydrogen Sulfide	0.54	0.24	0.53	0.24	0.54	0.35
Nitrogen	1.07	0.48	1.07	0.49	1.07	0.69
Helium	0.02	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.02	0.04	0.02
Ammonia	0.41	0.19	0.40	0.18	0.19	0.12
Phenol	0.09	0.04	0.09	0.04	0.09	0.06
Benzene	10.34	4.65	10.68	4.84	10.60	6.90
Water	--	54.95	--	54.54	--	34.92
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	655	--	752	--	557	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.006810	--	0.006699	--	0.002278	--
Product Gas Rate, SCF/hr	2.4389	--	2.4548	--	2.3932	--
Product Benzene Rate, lb-mol/hr	0.000622	--	0.000633	--	0.000630	--
Product Gas Composition, mol %						
Carbon Monoxide	8.83	4.47	8.28	4.25	10.12	7.59
Carbon Dioxide	20.64	10.46	20.96	10.75	19.72	14.81
Hydrogen	30.08	15.23	30.35	15.56	29.38	21.98
Methane	28.54	14.21	28.36	14.49	28.73	21.69
Ethane	0.90	0.48	0.90	0.46	0.91	0.68
Propane	0.23	0.12	0.23	0.12	0.23	0.18
Butane	0.04	0.02	0.04	0.02	0.03	0.02
Hydrogen Sulfide	0.50	0.25	0.50	0.26	0.51	0.38
Nitrogen	1.00	0.50	1.00	0.52	1.01	0.76
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Ammonia	0.32	0.16	0.31	0.16	0.12	0.08
Phenol	0.06	0.03	0.06	0.03	0.06	0.04
Benzene	8.82	4.49	8.97	4.59	6.86	9.14
Water	--	49.55	--	48.76	--	24.90
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000534	--	0.000558	--	0.000439	--
CO_2 Produced, lb-mol/hr	0.000533	--	0.000556	--	0.000441	--
H_2 Produced, lb-mol/hr	0.000519	--	0.000554	--	0.000438	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.53	--	0.56	--	0.44	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 35. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	103		104		105	
Feed Water Rate, lb-mol/hr	0.003466		0.003466		0.003393	
Feed Gas Rate, SCF/hr	2.2194		2.2194		2.2270	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000687		0.000667	
Feed H_2O/Gas Ratio (mol)	0.52		0.52		0.51	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.55	11.43	17.52	11.42	17.80	11.69
Carbon Dioxide	14.10	9.19	14.08	9.18	14.27	9.37
Hydrogen	24.28	15.84	24.25	15.80	23.90	15.69
Methane	30.39	19.79	30.35	19.78	30.66	20.06
Ethane	0.96	0.63	0.96	0.63	0.99	0.65
Propane	0.25	0.16	0.25	0.16	0.25	0.16
Butane	0.08	0.05	0.08	0.05	0.08	0.05
Hydrogen Sulfide	0.54	0.35	0.54	0.35	0.51	0.34
Nitrogen	1.07	0.70	1.07	0.70	1.01	0.70
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Ammonia	0.19	0.12	0.19	0.12	0.19	0.12
Phenol	0.09	0.06	0.09	0.06	0.09	0.06
Benzene	10.46	6.78	10.58	6.87	10.21	6.72
Water	--	34.87	--	34.85	--	34.36
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	656	--	753	--	557	--
Reactor Pressure, psig	200	--	200	--	100	--
Product Water Rate, lb-mol/hr	0.002290	--	0.002205	--	0.002143	--
Product Gas Rate, SCF/hr	2.4017	--	2.4190	--	2.2797	--
Product Benzene Rate, lb-mol/hr	0.000622	--	0.000625	--	0.000605	--
Product Gas Composition, mol %						
Carbon Monoxide	9.56	7.17	9.01	6.84	13.38	10.00
Carbon Dioxide	20.13	15.11	20.53	15.58	17.82	13.35
Hydrogen	29.66	22.36	30.11	22.77	26.32	19.76
Methane	28.64	21.49	28.50	21.62	29.75	22.49
Ethane	0.92	0.69	0.90	0.68	0.95	0.72
Propane	0.23	0.17	0.23	0.18	0.25	0.18
Butane	0.03	0.02	0.04	0.03	0.05	0.03
Hydrogen Sulfide	0.51	0.38	0.51	0.38	0.46	0.34
Nitrogen	1.01	0.75	1.00	0.76	1.09	0.82
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Ammonia	0.10	0.08	0.10	0.08	0.11	0.08
Phenol	0.06	0.04	0.06	0.04	0.06	0.05
Benzene	9.11	6.76	8.97	6.82	9.72	6.94
Water	--	24.95	--	24.19	--	25.21
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000476	--	0.000509	--	0.000273	--
CO_2 Produced, lb-mol/hr	0.000472	--	0.000509	--	0.000260	--
H_2 Produced, lb-mol/hr	0.000469	--	0.000507	--	0.000256	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.48	--	0.51	--	0.27	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 36. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	106		107		108	
Feed Water Rate, lb-mol/hr	0.003466		0.003429		0.007802	
Feed Gas Rate, SCF/hr	2.2270		2.2270		2.2263	
Feed Benzene Rate, lb-mol/hr	0.000670		0.000678		0.000670	
Feed H_2O/Gas Ratio (mol)	0.52		0.51		1.20	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.80	11.60	17.77	11.63	80.40	36.52
Carbon Dioxide	14.27	9.30	14.25	9.32	--	--
Hydrogen	23.88	15.57	23.86	15.61	8.07	3.65
Methane	30.55	19.90	30.51	19.96	--	--
Ethane	0.99	0.65	0.99	0.64	--	--
Propane	0.25	0.16	0.25	0.16	--	--
Butane	0.08	0.05	0.08	0.05	--	--
Hydrogen Sulfide	0.51	0.33	0.51	0.33	0.76	0.34
Nitrogen	1.01	0.70	1.07	0.70	--	--
Helium	0.01	0.01	0.01	0.01	--	--
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.05	0.02
Ammonia	0.19	0.12	0.19	0.12	0.42	0.19
Phenol	0.09	0.06	0.09	0.06	0.09	0.04
Benzene	10.34	6.70	10.39	6.80	10.21	4.65
Water	--	34.83	--	34.59	--	54.59
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	652	--	751	--	753	--
Reactor Pressure, psig	100	--	100	--	50	--
Product Water Rate, lb-mol/hr	0.002229	--	0.002119	--	0.006663	--
Product Gas Rate, SCF/hr	2.2874	--	2.2952	--	2.7072	--
Product Benzene Rate, lb-mol/hr	0.000611	--	0.000622	--	0.000605	--
Product Gas Composition, mol %						
Carbon Monoxide	12.28	9.17	11.51	8.71	51.67	27.67
Carbon Dioxide	18.44	13.77	16.93	14.33	16.30	8.73
Hydrogen	26.80	20.01	28.02	21.22	23.14	12.39
Methane	29.64	22.11	29.38	22.24	--	--
Ethane	0.95	0.71	0.93	0.70	--	--
Propane	0.24	0.18	0.24	0.18	--	--
Butane	0.05	0.03	0.05	0.03	--	--
Hydrogen Sulfide	0.46	0.34	0.47	0.36	0.64	0.34
Nitrogen	1.07	0.80	1.06	0.80	--	--
Helium	0.01	0.01	0.01	0.01	--	--
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.04	0.02
Ammonia	0.11	0.08	0.11	0.08	0.29	0.15
Phenol	0.06	0.04	0.06	0.05	0.05	0.03
Benzene	9.86	6.92	9.20	7.10	7.87	4.20
Water	--	25.81	--	24.17	--	46.47
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000345	--	0.000392	--	0.001250	--
CO_2 Produced, lb-mol/hr	0.000331	--	0.000378	--	0.001248	--
H_2 Produced, lb-mol/hr	0.000330	--	0.000372	--	0.001240	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.35	--	0.39	--	1.25	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 37. KINETICS TESTS (Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	109		110		111	
Feed Water Rate, lb-mol/hr	0.007679		0.007630		0.007643	
Feed Gas Rate, SCF/hr	2.2263		2.2292		2.2292	
Feed Benzene Rate, lb-mol/hr	0.000672		0.000670		0.000667	
Feed H_2O/Gas Ratio (mol)	1.20		1.21		1.21	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	80.40	36.83	17.85	8.21	17.85	8.22
Carbon Dioxide	--	--	14.33	6.59	14.43	6.60
Hydrogen	8.07	3.70	23.61	10.87	23.61	10.88
Methane	--	--	30.53	14.05	30.53	14.08
Ethane	--	--	1.00	0.46	1.00	0.46
Propane	--	--	0.25	0.11	0.25	0.11
Butane	--	--	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.76	0.35	0.49	0.23	0.49	0.23
Nitrogen	--	--	1.06	0.49	1.06	0.49
Helium	--	--	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.05	0.02	0.03	0.02	0.03	0.02
Ammonia	0.42	0.18	0.40	0.18	0.40	0.18
Phenol	0.09	0.04	0.35	0.16	0.35	0.16
Benzene	10.21	4.71	10.01	4.59	9.91	4.60
Water	--	54.17	--	53.99	--	53.92
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	753	--	559	--	658	--
Reactor Pressure, psig	500	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.006516	--	0.006479	--	0.006467	--
Product Gas Rate, SCF/hr	2.8083	--	2.5192	--	2.5381	--
Product Benzene Rate, lb-mol/hr	0.000608	--	0.000608	--	0.000602	--
Product Gas Composition, mol %						
Carbon Monoxide	46.66	25.63	5.48	2.88	4.80	2.53
Carbon Dioxide	19.07	10.47	23.57	12.40	24.04	12.70
Hydrogen	25.67	14.10	31.87	16.77	32.30	17.06
Methane	--	--	27.65	14.54	27.53	14.56
Ethane	--	--	0.91	0.48	0.90	0.48
Propane	--	--	0.22	0.12	0.22	0.12
Butane	--	--	0.04	0.02	0.04	0.02
Hydrogen Sulfide	0.62	0.34	0.45	0.23	0.44	0.23
Nitrogen	--	--	0.96	0.51	0.96	0.51
Helium	--	--	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.04	0.02	0.03	0.02	0.03	0.02
Ammonia	0.27	0.15	0.29	0.15	0.31	0.16
Phenol	0.05	0.03	0.27	0.14	0.25	0.13
Benzene	7.62	4.19	8.25	4.32	8.17	4.28
Water	--	45.07	--	47.41	--	47.19
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.001510	--	0.000764	--	0.000811	--
CO_2 Produced, lb-mol/hr	0.001509	--	0.000761	--	0.000805	--
H_2 Produced, lb-mol/hr	0.001510	--	0.000754	--	0.000799	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	1.51	--	0.76	--	0.81	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 38. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	112		113		114	
Feed Water Rate, lb-mol/hr	0.007679		0.007839		0.007716	
Feed Gas Rate, SCF/hr	2.2292		2.2242		2.2242	
Feed Benzene Rate, lb-mol/hr	0.000659		0.000667		0.000659	
Feed H_2O/Gas Ratio (mol)	1.22		1.24		1.24	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.87	8.19	17.87	8.09	17.88	8.16
Carbon Dioxide	14.35	6.58	14.37	6.50	14.37	6.56
Hydrogen	23.65	10.84	23.59	10.68	23.59	10.77
Methane	30.57	14.01	30.57	13.84	30.57	13.96
Ethane	1.00	0.46	1.01	0.46	1.01	0.46
Propane	0.25	0.11	0.25	0.11	0.25	0.11
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.49	0.23	0.48	0.22	0.48	0.22
Nitrogen	1.06	0.49	1.07	0.48	1.07	0.49
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.42	0.19	0.42	0.19	0.42	0.19
Phenol	0.36	0.16	0.36	0.16	0.36	0.16
Benzene	9.86	4.50	9.89	4.51	9.88	4.49
Water	--	54.18	--	54.70	--	54.37
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	753	--	558	--	655	--
Reactor Pressure, psig	1000	--	500	--	500	--
Product Water Rate, lb-mol/hr	0.006479	--	0.006675	--	0.006602	--
Product Gas Rate, SCF/hr	2.5476	--	2.4686	--	2.4868	--
Product Benzene Rate, lb-mol/hr	0.000602	--	0.000605	--	0.000602	--
Product Gas Composition, mol %						
Carbon Monoxide	4.48	2.36	7.56	3.89	6.51	3.37
Carbon Dioxide	24.33	12.86	22.10	11.36	22.80	11.82
Hydrogen	32.55	17.21	30.49	15.67	31.27	16.16
Methane	27.44	14.50	28.23	14.51	27.92	14.47
Ethane	0.90	0.47	0.92	0.47	0.92	0.48
Propane	0.22	0.11	0.21	0.11	0.23	0.12
Butane	0.04	0.02	0.04	0.02	0.04	0.02
Hydrogen Sulfide	0.41	0.22	0.41	0.21	0.41	0.21
Nitrogen	0.95	0.50	0.98	0.50	0.97	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.30	0.16	0.31	0.16	0.31	0.16
Phenol	0.26	0.14	0.27	0.14	0.27	0.14
Benzene	8.08	4.26	8.44	4.28	8.31	4.27
Water	--	47.17	--	48.76	--	48.25
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000833	--	0.000623	--	0.000694	--
CO_2 Produced, lb-mol/hr	0.000830	--	0.000627	--	0.000686	--
H_2 Produced, lb-mol/hr	0.000825	--	0.000621	--	0.000683	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.83	--	0.62	--	0.69	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 39. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	115		116		117	
Feed Water Rate, lb-mol/hr	0.007753		0.007557		0.007496	
Feed Gas Rate, SCF/hr	2.2242		2.2136		2.2136	
Feed Benzene Rate, lb-mol/hr	0.000656		0.000659		0.000667	
Feed H_2O/Gas Ratio (mol)	1.23		1.20		1.18	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.88	8.13	17.76	8.13	17.62	8.16
Carbon Dioxide	14.36	6.53	14.17	6.53	14.15	6.55
Hydrogen	23.65	10.73	24.05	11.08	24.00	11.11
Methane	30.58	13.91	30.56	14.07	30.50	14.12
Ethane	1.00	0.46	0.98	0.45	0.98	0.45
Propane	0.25	0.11	0.25	0.11	0.25	0.12
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.49	0.22	0.51	0.24	0.51	0.24
Nitrogen	1.06	0.49	1.07	0.49	1.07	0.50
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.42	0.19	0.33	0.15	0.40	0.19
Phenol	0.36	0.16	0.36	0.16	0.36	0.17
Benzene	9.83	4.60	9.84	4.56	10.04	4.63
Water	--	54.41	--	53.97	--	53.70
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	754	--	558	--	657	--
Reactor Pressure, psig	500	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.006650	--	0.006430	--	0.006271	--
Product Gas Rate, SCF/hr	2.5053	--	2.3961	--	2.4047	--
Product Benzene Rate, lb-mol/hr	0.000596	--	0.000596	--	0.000602	--
Product Gas Composition, mol %						
Carbon Monoxide	6.00	3.11	9.81	4.96	9.42	4.93
Carbon Dioxide	23.27	12.05	20.49	10.47	20.40	10.68
Hydrogen	31.55	16.34	28.85	14.79	29.68	15.49
Methane	27.82	14.41	29.00	14.86	28.74	15.04
Ethane	0.91	0.47	0.92	0.48	0.92	0.48
Propane	0.22	0.12	0.23	0.12	0.23	0.12
Butane	0.04	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.41	0.21	0.45	0.23	0.45	0.24
Nitrogen	0.98	0.51	1.01	0.52	1.00	0.53
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.31	0.16	0.31	0.16	0.31	0.16
Phenol	0.27	0.14	0.28	0.14	0.28	0.15
Benzene	8.18	4.20	8.58	4.36	8.50	4.44
Water	--	48.24	--	48.87	--	47.70
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000728	--	0.000478	--	0.000487	--
CO_2 Produced, lb-mol/hr	0.000729	--	0.000476	--	0.000490	--
H_2 Produced, lb-mol/hr	0.000723	--	0.000463	--	0.000485	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.73	--	0.48	--	0.49	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 40. KINETICS TESTS (Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	118		119		120	
Feed Water Rate, lb-mol/hr	0.007508		0.007447		0.007434	
Feed Gas Rate, SCF/hr	2.2136		2.2125		2.2125	
Feed Benzene Rate, lb-mol/hr	0.000650		0.000565		0.000659	
Feed H_2O/Gas Ratio (mol)	1.21		1.18		1.19	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.67	8.16	17.99	8.30	17.78	8.26
Carbon Dioxide	14.18	6.55	14.46	6.67	14.29	6.64
Hydrogen	24.07	11.12	24.11	11.12	23.83	11.07
Methane	30.58	14.12	30.83	14.22	30.47	14.16
Ethane	0.98	0.45	1.01	0.46	1.00	0.46
Propane	0.25	0.12	0.25	0.12	0.25	0.12
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.52	0.24	0.50	0.23	0.50	0.23
Nitrogen	1.07	0.50	1.10	0.51	1.09	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.40	0.19	0.41	0.19	0.40	0.19
Phenol	0.36	0.17	0.35	0.16	0.36	0.17
Benzene	9.80	4.51	8.87	4.09	9.91	4.60
Water	--	53.81	--	53.87	--	53.53
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	753	--	559	--	659	--
Reactor Pressure, psig	200	--	100	--	100	--
Product Water Rate, lb-mol/hr	0.006357	--	0.006295	--	0.006283	--
Product Gas Rate, SCF/hr	2.4134	--	2.3605	--	2.3771	--
Product Benzene Rate, lb-mol/hr	0.000594	--	0.000503	--	0.000602	--
Product Gas Composition, mol %						
Carbon Monoxide	8.88	4.62	12.51	6.44	11.73	6.11
Carbon Dioxide	20.83	10.84	18.82	9.69	18.96	9.87
Hydrogen	29.97	15.70	28.06	14.44	28.03	14.59
Methane	28.60	14.89	29.86	15.36	29.27	15.23
Ethane	0.92	0.48	0.96	0.50	0.96	0.50
Propane	0.23	0.12	0.26	0.13	0.24	0.12
Butane	0.04	0.02	0.03	0.02	0.03	0.02
Hydrogen Sulfide	0.45	0.23	0.45	0.23	0.44	0.23
Nitrogen	1.02	0.53	1.05	0.54	1.03	0.54
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.31	0.16	0.32	0.16	0.31	0.16
Phenol	0.28	0.14	0.27	0.14	0.28	0.15
Benzene	8.43	4.35	7.39	3.75	8.68	4.47
Water	--	47.90	--	48.58	--	47.99
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000524	--	0.000311	--	0.000346	--
CO_2 Produced, lb-mol/hr	0.000522	--	0.000333	--	0.000369	--
H_2 Produced, lb-mol/hr	0.000516	--	0.000334	--	0.000368	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.52	--	0.31	--	0.35	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 41. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	121		122		123	
Feed Water Rate, lb-mol/hr	0.007557		0.007643		0.007471	
Feed Gas Rate, SCF/hr	2.2125		2.2282		2.2282	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000656		0.000650	
Feed H_2O/Gas Ratio (mol)	1.20		1.22		1.21	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	17.73	8.18	17.77	8.16	17.78	8.26
Carbon Dioxide	14.25	6.57	14.27	6.55	14.29	6.64
Hydrogen	23.76	10.96	23.97	11.01	23.99	11.15
Methane	30.38	14.01	30.49	14.00	30.52	14.18
Ethane	0.99	0.46	0.99	0.45	0.99	0.46
Propane	0.25	0.11	0.25	0.11	0.25	0.12
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.50	0.23	0.51	0.23	0.51	0.24
Nitrogen	1.09	0.50	1.06	0.49	1.07	0.50
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.40	0.19	0.40	0.18	0.40	0.19
Phenol	0.36	0.16	0.36	0.16	0.36	0.17
Benzene	10.17	4.69	9.83	4.49	9.72	4.51
Water	--	53.88	--	54.11	--	53.52
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	753	--	557	--	658	--
Reactor Pressure, psig	100	--	50	--	50	--
Product Water Rate, lb-mol/hr	0.006405	--	0.006467	--	0.006344	--
Product Gas Rate, SCF/hr	2.3855	--	2.3361	--	2.3523	--
Product Benzene Rate, lb-mol/hr	0.000616	--	0.000599	--	0.000591	--
Product Gas Composition, mol %						
Carbon Monoxide	11.45	5.86	13.16	6.65	12.31	6.34
Carbon Dioxide	19.41	9.93	17.27	8.69	18.53	9.55
Hydrogen	27.55	14.14	27.46	13.88	27.77	14.32
Methane	29.41	15.04	29.90	15.07	29.44	15.17
Ethane	0.94	0.48	0.96	0.49	0.95	0.49
Propane	0.23	0.12	0.24	0.12	0.24	0.12
Butane	0.03	0.02	0.04	0.02	0.04	0.02
Hydrogen Sulfide	0.44	0.23	0.48	0.24	0.48	0.25
Nitrogen	1.04	0.54	1.05	0.53	1.04	0.54
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.31	0.16	0.31	0.16	0.31	0.16
Phenol	0.28	0.14	0.28	0.14	0.28	0.15
Benzene	8.87	8.52	8.61	4.42	8.53	4.39
Water	--	48.80	--	49.57	--	48.48
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000368	--	0.000276	--	0.000322	--
CO_2 Produced, lb-mol/hr	0.000393	--	0.000268	--	0.000320	--
H_2 Produced, lb-mol/hr	0.000336	--	0.000272	--	0.000316	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.37	--	0.28	--	0.32	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 42. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	124		125		126	
Feed Water Rate, lb-mol/hr	0.007385		0.007447		0.007471	
Feed Gas Rate, SCF/hr	2.2338		2.2338		2.2338	
Feed Benzene Rate, lb-mol/hr	0.000670		0.000678		0.000670	
Feed H_2O/Gas Ratio (mol)	1.20		1.16		1.15	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.09	8.48	18.08	8.44	18.09	8.43
Carbon Dioxide	14.50	6.80	14.49	6.77	14.50	6.78
Hydrogen	23.04	10.80	23.03	10.75	23.04	10.73
Methane	30.69	14.39	30.68	14.32	30.69	14.30
Ethane	1.02	0.48	1.02	0.47	1.02	0.47
Propane	0.25	0.12	0.25	0.11	0.25	0.11
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.49	0.23	0.49	0.23	0.49	0.23
Nitrogen	1.09	0.51	1.09	0.51	1.09	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.40	0.19	0.40	0.19	0.40	0.19
Phenol	0.92	0.43	0.92	0.43	0.92	0.43
Benzene	9.39	4.40	9.43	4.44	9.39	4.38
Water	--	53.11	--	53.28	--	53.40
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	554	--	655	--	753	--
Reactor Pressure, psig	1000	--	1000	--	1000	--
Product Water Rate, lb-mol/hr	0.006283	--	0.006295	--	0.006344	--
Product Gas Rate, SCF/hr	2.5148	--	2.5242	--	2.5431	--
Product Benzene Rate, lb-mol/hr	0.000608	--	0.000613	--	0.000605	--
Product Gas Composition, mol %						
Carbon Monoxide	6.23	3.32	5.71	3.05	5.20	2.77
Carbon Dioxide	23.34	12.45	23.72	12.65	24.09	12.85
Hydrogen	31.10	16.54	31.36	16.73	31.66	16.90
Methane	27.92	14.90	27.81	14.84	27.67	14.76
Ethane	0.91	0.48	0.92	0.48	0.90	0.48
Propane	0.22	0.12	0.22	0.12	0.24	0.13
Butane	0.04	0.02	0.04	0.02	0.04	0.02
Hydrogen Sulfide	0.42	0.22	0.42	0.22	0.42	0.21
Nitrogen	0.99	0.53	0.99	0.53	0.98	0.52
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.29	0.16	0.29	0.16	0.29	0.15
Phenol	0.66	0.35	0.65	0.35	0.66	0.35
Benzene	7.84	4.18	7.83	4.21	7.81	4.11
Water	--	46.71	--	46.61	--	46.73
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000729	--	0.000765	--	0.000789	--
CO_2 Produced, lb-mol/hr	0.000719	--	0.000760	--	0.000799	--
H_2 Produced, lb-mol/hr	0.000720	--	0.000754	--	0.000783	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.73	--	0.76	--	0.80	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 43. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	127		128		129	
Feed Water Rate, lb-mol/hr	0.007398		0.007361		0.007434	
Feed Gas Rate, SCF/hr	2.2336		2.2336		2.2336	
Feed Benzene Rate, lb-mol/hr	0.000667		0.000670		0.000670	
Feed H_2O/Gas Ratio (mol)	1.16		1.15		1.17	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.17	8.51	18.17	8.53	18.17	8.49
Carbon Dioxide	14.55	6.82	14.55	6.83	14.55	6.80
Hydrogen	22.87	10.72	22.88	10.74	22.88	10.69
Methane	30.73	14.39	30.72	14.42	30.72	14.35
Ethane	1.02	0.48	1.02	0.48	1.02	0.47
Propane	0.25	0.12	0.25	0.12	0.25	0.12
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.49	0.23	0.49	0.23	0.49	0.23
Nitrogen	1.09	0.51	1.09	0.51	1.09	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.40	0.19	0.40	0.19	0.40	0.19
Phenol	0.92	0.43	0.92	0.43	0.92	0.43
Benzene	9.39	4.38	9.39	4.41	9.39	4.39
Water	--	53.16	--	53.15	--	53.27
Total	100.00	100.00	100.00	100.10	100.00	100.00
Reactor Temperature, °F	557	--	654	--	753	--
Reactor Pressure, psig	200	--	200	--	200	--
Product Water Rate, lb-mol/hr	0.006246	--	0.006210	--	0.006295	--
Product Gas Rate, SCF/hr	2.4160	--	2.4164	--	2.4250	--
Product Benzene Rate, lb-mol/hr	0.000608	--	0.000607	--	0.000611	--
Product Gas Composition, mol %						
Carbon Monoxide	10.26	5.39	10.07	5.31	9.69	5.08
Carbon Dioxide	20.54	10.80	20.66	10.89	20.89	10.96
Hydrogen	28.29	14.87	28.50	14.97	28.73	15.02
Methane	28.99	15.24	28.94	15.26	28.83	15.13
Ethane	0.94	0.50	0.94	0.50	0.94	0.49
Propane	0.23	0.12	0.23	0.12	0.23	0.12
Butane	0.04	0.02	0.04	0.02	0.04	0.02
Hydrogen Sulfide	0.43	0.23	0.43	0.23	0.43	0.23
Nitrogen	1.03	0.54	1.03	0.54	1.02	0.54
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.01	0.01
Ammonia	0.30	0.16	0.30	0.16	0.30	0.16
Phenol	0.70	0.37	0.70	0.37	0.68	0.36
Benzene	8.12	4.27	8.12	4.27	8.20	4.27
Water	--	47.47	--	47.34	--	47.60
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000472	--	0.000485	--	0.000509	--
CO_2 Produced, lb-mol/hr	0.000470	--	0.000486	--	0.000502	--
H_2 Produced, lb-mol/hr	0.000466	--	0.000474	--	0.000497	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.47	--	0.48	--	0.51	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 44. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	130		131		132	
Feed Water Rate, lb-mol/hr	0.007349		0.007459		0.007447	
Feed Gas Rate, SCF/hr	2.2334		2.2334		2.2334	
Feed Benzene Rate, lb-mol/hr	0.000667		0.000757		0.000667	
Feed H_2O/Gas Ratio (mol)	1.14		1.14		1.15	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	18.04	8.48	17.79	8.36	18.04	8.42
Carbon Dioxide	14.52	6.78	14.22	6.68	14.42	6.73
Hydrogen	22.95	10.79	22.64	10.63	22.95	10.71
Methane	30.92	14.53	30.50	14.32	30.92	14.43
Ethane	0.94	0.44	0.93	0.44	1.02	0.47
Propane	0.25	0.12	0.24	0.11	0.25	0.12
Butane	0.08	0.04	0.08	0.04	0.08	0.04
Hydrogen Sulfide	0.49	0.23	0.49	0.23	0.49	0.23
Nitrogen	1.09	0.51	1.08	0.51	1.09	0.51
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.40	0.19	0.40	0.19	0.40	0.19
Phenol	0.92	0.43	0.91	0.43	0.92	0.43
Benzene	9.36	4.39	10.68	4.97	9.38	4.36
Water	--	53.05	--	53.07	--	53.34
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	558	--	654	--	752	--
Reactor Pressure, psig	100	--	100	--	100	--
Product Water Rate, lb-mol/hr	0.006222	--	0.006296	--	0.006320	--
Product Gas Rate, SCF/hr	2.3496	--	2.3661	--	2.3743	--
Product Benzene Rate, lb-mol/hr	0.000605	--	0.000687	--	0.000605	--
Product Gas Composition, mol %						
Carbon Monoxide	13.08	6.81	12.15	6.34	11.92	6.17
Carbon Dioxide	18.30	9.52	18.63	9.72	19.17	9.94
Hydrogen	26.46	13.77	26.64	13.90	27.26	14.13
Methane	29.97	15.60	29.42	15.35	29.55	15.42
Ethane	0.98	0.51	0.96	0.50	0.96	0.50
Propane	0.24	0.12	0.25	0.13	0.25	0.13
Butane	0.04	0.02	0.04	0.02	0.04	0.02
Hydrogen Sulfide	0.46	0.24	0.45	0.24	0.46	0.24
Nitrogen	1.06	0.55	1.04	0.54	1.05	0.54
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.31	0.16	0.31	0.16	0.31	0.16
Phenol	0.70	0.36	0.69	0.36	0.71	0.37
Benzene	8.36	4.32	9.38	4.88	8.28	4.26
Water	--	47.00	--	47.84	--	48.10
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000291	--	0.000339	--	0.000363	--
CO_2 Produced, lb-mol/hr	0.000295	--	0.000340	--	0.000364	--
H_2 Produced, lb-mol/hr	0.000290	--	0.000335	--	0.000358	--
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.29	--	0.34	--	0.36	--

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 45. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	133		134		135	
Feed Water Rate, lb-mol/hr	0.006124		0.006108		0.006196	
Feed Gas Rate, SCF/hr	2.2555		2.2574		2.2375	
Feed Benzene Rate, lb-mol/hr	--		0.000678		0.000668	
Feed H_2O/Gas Ratio (mol)	1.0		1.0		1.0	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	21.70	10.33	19.39	10.04	19.21	9.88
Carbon Dioxide	17.20	8.19	15.37	7.96	15.22	7.83
Hydrogen	27.70	13.17	24.75	12.82	24.54	12.62
Methane	31.10	15.81	27.79	14.39	27.54	14.16
Ethane	0.99	0.47	0.88	0.46	0.87	0.45
Propane	0.26	0.12	0.23	0.12	0.23	0.12
Butane	0.12	0.06	0.11	0.06	0.10	0.05
Hydrogen Sulfide	0.28	0.13	0.25	0.13	0.25	0.13
Nitrogen	0.60	0.29	0.54	0.28	0.52	0.27
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	--	--	0.30	0.16	0.29	0.15
Phenol	--	--	--	--	0.99	0.51
Benzene	--	--	10.34	5.36	10.19	5.24
Water	--	51.41	--	48.20	--	48.57
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	651		651		650	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.004991		0.004948		0.005072	
Product Gas Rate, SCF/hr	2.5986		2.5909		2.5583	
Product Benzene Rate, lb-mol/hr	--		0.000614		0.000609	
Product Gas Composition, mol %						
Carbon Monoxide	4.70	2.70	5.57	3.21	5.68	3.36
Carbon Dioxide	28.35	16.29	25.24	14.97	25.05	14.82
Hydrogen	38.07	21.88	33.68	19.68	33.33	19.75
Methane	26.86	15.44	25.03	15.06	24.84	14.70
Ethane	0.85	0.49	0.77	0.45	0.78	0.46
Propane	0.22	0.13	0.20	0.12	0.20	0.12
Butane	0.09	0.05	0.08	0.05	0.08	0.05
Hydrogen Sulfide	0.21	0.12	0.20	0.12	0.20	0.12
Nitrogen	0.60	0.34	0.54	0.31	0.54	0.32
Helium	0.02	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Ammonia	--	--	0.20	0.12	0.20	0.12
Phenol	--	--	--	--	0.68	0.40
Benzene	--	--	8.34	4.85	8.37	4.90
Water	--	42.53	--	41.03	--	40.85
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000954		0.000862		0.000844	
CO_2 Produced, lb-mol/hr	0.000905		0.000850		0.000841	
H_2 Produced, lb-mol/hr	0.000946		0.000856		0.000843	
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.95		0.86		0.84	

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 46. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	136		137		138	
Feed Water Rate, lb-mol/hr	0.006161		0.006154		0.006350	
Feed Gas Rate, SCF/hr	2.2327		2.2425		2.2387	
Feed Benzene Rate, lb-mol/hr	0.000678		0.000689		0.000680	
Feed H_2O/Gas Ratio (mol)	1.0		1.0		1.0	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.17	9.89	19.34	9.77	19.13	9.74
Carbon Dioxide	15.20	7.84	14.77	7.74	15.18	7.73
Hydrogen	24.47	12.62	24.79	12.47	24.43	12.44
Methane	27.48	14.17	27.71	14.02	27.47	13.99
Ethane	0.87	0.45	0.84	0.44	0.90	0.46
Propane	0.23	0.12	0.22	0.12	0.31	0.16
Butane	0.10	0.05	0.10	0.05	0.14	0.07
Hydrogen Sulfide	0.25	0.13	0.22	0.12	0.31	0.16
Nitrogen	0.52	0.27	0.52	0.27	0.45	0.23
Helium	0.02	0.01	0.02	0 01	0.02	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.31	0.16	0.30	0.16	0.30	0.16
Phenol	0.99	0.51	0.95	0.50	0.98	0.50
Benzene	10.36	5.33	10.19	5.33	10.35	5.26
Water	--	48.44	--	48.99	--	49.08
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	651		650		651	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.005014		0.005007		0.005190	
Product Gas Rate, SCF/hr	2.5541		2.5653		2.5513	
Product Benzene Rate, lb-mol/hr	0.000618		0.000629		0.000621	
Product Gas Composition, mol %						
Carbon Monoxide	5.77	3.43	5.84	3.48	6.06	3.51
Carbon Dioxide	24.68	14.75	24.74	14.74	24.66	14.45
Hydrogen	33.39	19.77	33.23	19.79	33.10	19.39
Methane	24.98	14.78	24.88	14.82	24.92	14.60
Ethane	0.77	0.46	0.79	0.47	0.82	0.48
Propane	0.20	0.12	0.20	0.12	0.27	0.16
Butane	0.06	0.05	0.08	0.05	0.08	0.05
Hydrogen Sulfide	0.20	0.12	0.20	0.12	0.20	0.12
Nitrogen	0.55	0.33	0.56	0.33	0.55	0.32
Helium	0.02	0.01	0.01	0.01	0.02	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Ammonia	0.20	0.12	0.20	0.12	0.21	0.12
Phenol	0.68	0.41	0.73	0.40	0.68	0.40
Benzene	8.45	5.00	8.51	5.08	8.40	4.95
Water	--	40.63	--	40.45	--	41.42
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000835		0.000832		0.000820	
CO_2 Produced, lb-mol/hr	0.000824		0.000824		0.000810	
H_2 Produced, lb-mol/hr	0.000835		0.000833		0.000818	
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.84		0.83		0.82	

Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

Table B-4, Part 47. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	139		140		141	
Feed Water Rate, lb-mol/hr	0.0006125		0.006120		0.006117	
Feed Gas Rate, SCF/hr	2.1953		2.1851		2.2093	
Feed Benzene Rate, lb-mol/hr	0.000680		0.000679		0.000676	
Feed H_2O/Gas Ratio (mol)	1.0		1.0		1.0	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %[a]						
Carbon Monoxide	19.16	9.85	19.34	9.86	19.17	9.90
Carbon Dioxide	15.13	7.78	15.41	7.85	14.85	8.13
Hydrogen	24.39	12.54	24.89	12.58	24.88	12.59
Methane	27.44	14.06	27.68	14.11	27.45	14.17
Ethane	0.91	0.47	0.94	0.48	0.92	0.48
Propane	0.25	0.13	0.25	0.13	0.23	0.12
Butane	0.10	0.05	0.10	0.05	0.10	0.05
Hydrogen Sulfide	0.25	0.13	0.26	0.13	0.24	0.13
Nitrogen	0.53	0.27	0.51	0.27	0.52	0.27
Helium	0.01	0.01	0.02	0.01	0.02	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.01	0.03	0.01
Ammonia	0.30	0.16	0.31	0.16	0.30	0.16
Phenol	1.00	0.52	1.02	0.52	1.00	0.52
Benzene	10.50	5.40	9.64	4.81	9.29	5.31
Water	--	48.62	--	49.03	--	48.15
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	651		651		650	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.004936		0.005006		0.004959	
Product Gas Rate, SCF/hr	2.5018		2.4808		2.5077	
Product Benzene Rate, lb-mol/hr	0.000622		0.000624		0.000618	
Product Gas Composition, mol %						
Carbon Monoxide	6.12	3.63	6.38	3.75	6.38	3.81
Carbon Dioxide	24.57	14.57	24.45	14.36	24.31	14.51
Hydrogen	32.89	19.50	32.59	19.15	32.66	19.49
Methane	24.99	14.82	25.01	14.70	24.85	14.89
Ethane	0.77	0.46	0.82	0.49	0.78	0.46
Propane	0.20	0.12	0.20	0.12	0.20	0.12
Butane	0.07	0.04	0.06	0.04	0.07	0.04
Hydrogen Sulfide	0.22	0.13	0.22	0.13	0.22	0.13
Nitrogen	0.53	0.31	0.55	0.32	0.53	0.32
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.02	0.03	0.02	0.03	0.02
Ammonia	0.21	0.12	0.22	0.13	0.20	0.12
Phenol	0.69	0.41	0.70	0.41	0.68	0.40
Benzene	8.63	5.12	8.76	5.12	9.08	5.45
Water	--	40.71	--	41.24	--	40.23
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000800		0.000793		0.000782	
CO_2 Produced, lb-mol/hr	0.000785		0.000778		0.000791	
H_2 Produced, lb-mol/hr	0.000782		0.000755		0.000801	
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.80		0.79		0.78	

[a] Also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 1.2 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 48. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	142		143		144	
Feed Water Rate, lb-mol/hr	0.006124		0.006112		0.006124	
Feed Gas Rate, SCF/hr	2.2382		2.2127		2.2377	
Feed Benzene Rate, lb-mol/hr	0.000674		0.000678		0.000681	
Feed H_2O/Gas Ratio (mol)	1.0		1.0		1.0	
Basis for Analysis	Dry	Wet	Dry	Wet	Dry	Wet
Feed Gas Composition, mol %*						
Carbon Monoxide	19.45	10.01	19.40	9.96	19.41	10.00
Carbon Dioxide	15.31	7.94	15.38	7.90	15.39	7.93
Hydrogen	24.71	12.78	24.67	12.73	24.69	12.78
Methane	22.77	14.35	27.61	14.27	27.65	14.34
Ethane	0.88	0.45	0.89	0.46	0.89	0.46
Propane	0.23	0.12	0.23	0.12	0.23	0.12
Butane	0.11	0.05	0.11	0.06	0.11	0.06
Hydrogen Sulfide	0.25	0.13	0.25	0.13	0.25	0.12
Nitrogen	0.54	0.28	0.55	0.28	0.54	0.28
Helium	0.01	0.01	0.02	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.01	0.03	0.02	0.03	0.01
Ammonia	0.31	0.16	0.31	0.16	0.31	0.16
Phenol	1.01	0.52	1.01	0.52	1.00	0.52
Benzene	9.39	4.84	9.54	4.90	9.49	4.89
Water	--	48.35	--	48.48	--	47.32
Total	100.00	100.00	100.00	100.00	100.00	100.00
Reactor Temperature, °F	650		651		650	
Reactor Pressure, psig	500		500		500	
Product Water Rate, lb-mol/hr	0.004948		0.004941		0.004995	
Product Gas Rate, SCF/hr	2.5400		2.5074		2.5394	
Product Benzene Rate, lb-mol/hr	0.000606		0.000615		0.000610	
Product Gas Composition, mol %						
Carbon Monoxide	6.71	3.98	6.72	3.98	6.77	4.00
Carbon Dioxide	24.56	14.57	24.57	14.46	24.44	14.46
Hydrogen	33.10	19.64	32.96	19.49	32.92	19.47
Methane	25.36	15.05	25.47	14.98	25.31	14.99
Ethane	0.79	0.47	0.80	0.47	0.79	0.47
Propane	0.20	0.12	0.21	0.12	0.21	0.12
Butane	0.07	0.04	0.07	0.04	0.07	0.04
Hydrogen Sulfide	0.19	0.12	0.20	0.12	0.19	0.11
Nitrogen	0.51	0.30	0.52	0.31	0.51	0.30
Helium	0.01	0.01	0.01	0.01	0.01	0.01
Carbonyl Sulfide	0.03	0.03	0.03	0.02	0.03	0.02
Ammonia	0.21	0.12	0.21	0.12	0.21	0.12
Phenol	0.69	0.41	0.70	0.41	0.69	0.41
Benzene	7.57	4.58	7.93	4.69	7.85	4.64
Water	--	40.56	--	40.78	--	40.84
Total	100.00	100.00	100.00	100.00	100.00	100.00
CO Converted, lb-mol/hr	0.000778		0.000767		0.000772	
CO_2 Produced, lb-mol/hr	0.000769		0.000745		0.000763	
H_2 Produced, lb-mol/hr	0.000774		0.000757		0.000764	
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.78		0.77		0.77	

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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Table B-4, Part 49. KINETICS TESTS
(Shell 538 Shift Catalyst, 4 x 6 Mesh Spheres, 10.00 g)

Run No.	145	
Feed Water Rate, lb-mol/hr	0.006124	
Feed Gas Rate, SCF/hr	2.2303	
Feed Benzene Rate, lb-mol/hr	0.000671	
Feed H_2O/Gas Ratio (mol)	1.0	
Basis for Analysis	Dry	Wet
Feed Gas Composition, mol %*		
Carbon Monoxide	19.44	9.99
Carbon Dioxide	15.42	7.93
Hydrogen	24.83	12.79
Methane	27.66	14.35
Ethane	0.88	0.45
Propane	0.23	0.12
Butane	0.11	0.06
Hydrogen Sulfide	0.25	0.13
Nitrogen	0.54	0.27
Helium	0.01	0.01
Carbonyl Sulfide	0.03	0.02
Ammonia	0.31	0.16
Phenol	1.01	0.52
Benzene	9.28	4.82
Water	--	48.38
Total	100.00	100.00
Reactor Temperature, °F	651	
Reactor Pressure, psig	500	
Product Water Rate, lb-mol/hr	0.004948	
Product Gas Rate, SCF/hr	2.5216	
Product Benzene Rate, lb-mol/hr	0.000611	
Product Gas Composition, mol %		
Carbon Monoxide	6.94	4.11
Carbon Dioxide	24.36	14.36
Hydrogen	32.67	19.34
Methane	25.39	15.13
Ethane	0.80	0.47
Propane	0.21	0.12
Butane	0.07	0.04
Hydrogen Sulfide	0.20	0.12
Nitrogen	0.52	0.31
Helium	0.01	0.01
Carbonyl Sulfide	0.03	0.02
Ammonia	0.21	0.12
Phenol	0.70	0.41
Benzene	7.89	4.64
Water	--	40.80
Total	100.00	100.00
CO Converted, lb-mol/hr	0.000759	
CO_2 Produced, lb-mol/hr	0.000740	
H_2 Produced, lb-mol/hr	0.000734	
Rate of CO Conversion X 10^{-4} lb-mol/hr-g catalyst	0.76	

*Feed also contains 4.3 ppm ethyl mercaptan, 1.4 ppm n-propyl mercaptan, 4.6 ppm isopropyl mercaptan, and 2.6 ppm disulfides.

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