

Hydrocarbon type:									
Saturates									
Olefins									
Aromatics, total, percent (Aphelenees)	12.92		3.07		2.62				
Aromatics, polynuclear									
Luminometer number									
Analytic point, °F		86							
H/C atom ratio									
Elemental analysis, wt%:									
C	88.3	83.6	88.3	90.0					
H	8.19	12.41	9.71	7.58					
N	0.81	0.19	0.42	1.01					
S	0.22	0.24	0.18	0.22					
O	1.35	0.26	0.94	1.20					
Trace metal analysis, ppm:									
V									
Ni									
Kn									
K									
NH									
Ca									
Pb									
Cu									
Fe									
Bi									
Zn									
Be									
Mo									
W									
Tl									
Refractive index		1.449	1.514	1.556					

(b) H-Coal, data from ref. 5

Property	Test	Sample J-8088	950°F cut	Distillate categories	950°F+ cut
Gravity, ° API (specific)					
Boiling range:					
Initial boiling point, °F		482			950
5 %					
10 %		569			
20 %		620			
30 %		657			
50 %		759			
60 %		866			
70 %		>963			
80 %					
90 %					
95 %					
Final boiling point, °F			950		
Pour point, °F		>115			
Flashpoint, °F		320			
Viscosity at 21 °F, cP		318.3			
at °F					
at °F					
Ash, wt %	D-482	0.02			
Ash: melt temperature, °F					
Heat of combustion, Btu/lb					
Carbon residue (Conradson), wt %		17.411			
Carbon remaining, wt %		17.3			
Thermal stability					
Electrical conductivity					
Water					
Sediment					
Neutrality					
Corrosion					

Hydrocarbon type											
Sat. rates											
Olefins											
Aromatics, total											
Aromatics, polynuclear											
Luminescence number											
Analysis point, °F											
H/C atom ratio											
Elemental analysis, wt%:											
C	89.0	90.13	87.52								
H	7.94	8.85	6.26								
N	0.77	0.39	1.39								
S	0.42	0.19	0.95								
O	2.12	0.53	3.56								
Trace metal analysis, ppm:											
V											
Ni	3.0										
Na	1.0										
K	0.8										
Mg	0.4										
Ca	1.0										
Pb	8.0										
Cu	1.0										
Fe							20.0				
Si							2.0				
Zn											
Ba											
Mn											
Mo											
W											
Ti							80.0				
Al							11.0				

TABLE 6. - Continued.

g) H-Coal hydrocarbon bottoms (filtrate) data from memo for record by Theodore B. Mroz, NASA Lewis Research Center, Feb. 28, 1976^c

Property	Test	Distillate categories			
		Illinois Geologic Institute	General Electric	Westinghouse	PARC
Gravity, ° API (specific)					
Bolting range:					
Initial bolting point, °F					
5 %					
10 %					
20 %					
30 %					
40 %					
50 %					
60 %					
70 %					
80 %					
90 %					
95 %					
Final bolting point, °F					
Pour point, °F					
Flashpoint, °F					
Viscosity at					
at					
at					
Ash, wt %					
Ash: melt temperature, °F					
Heat of combustion, Btu/lb					
Carbon residue					
Carbon remainder, wt %					
Thermal stability					
Electrical conductivity					
Water					
Sediment					
Neutrality					
Corrosion					

Hydrocarbon type		Neut. A.	X-ray	At. abs.					
Saturates									
Olefins									
Aromatics, total									
Aromatics, polynuclear									
Luminometer number									
Aniline point, °F									
Trace metal analyses, ppm:									
V		12 - 15	22.6	0.8	1.66				1.0
Ni		18							
Na		3.1		2.08				10.0	
K		1.7	0.8	1.2	10.08				
Mg		1.8	<4.5	0.2	0.95				
Ca		1.49	2.3	1.89	7.5			2.0	
Pb					0.61				
Cu				0.12	0.04				
Fe				3.06					1.0
Si		12.1	4.1					35.8	8.0
Zn			5.0						2.0
Ba		1.5		0.62					
Mn		0.8							
Mo		1.8							
W		<0.1							
Tl			2.4						2.0

Total of 52 trace elements listed in reference. Trace elements in filter cake also listed in reference.

TABLE 6. - Continued.

(K) H-Coal, data from ref. 6

Property	Test	Distillate categories				
		Total	Initial/375°F	375° - 650°F	650° - 975°F	
Gravity, °API (specific)						
Boiling range:						
Initial boiling point, °F:						
5 %				375		650
10 %						
20 %						
30 %						
40 %						
50 %						
60 %						
70 %						
80 %						
90 %						
95 %						
Final boiling point, °F:						
Pour point, °F		975	375	650		975
Flashpoint, °F						
Viscosity at						
°F						
°F						
°F						
Ash, wt %						
Ash: melt temperature, °F						
Heat of combustion, Btu/lb						
Carbon residue						
Carbon remaining, wt %						
Thermal stability						
Electrical conductivity						
Water						
Sulfur						
Neutrality						
Corrosion						

Hydrocarbon type:										
Saturates										
Olefins										
Aromatics, total										
Aromatics, polycyclicar										
Luminoimeter number										
Analyte point, °F										
H/C atom ratio										
Elemental analysis, wt%:										
C	87.3	84.5	88.8	89.4						
H	11.9	13.6	11.0	10.2						
N	0.1	0.1	0.1	0.1						
S	0.1	0.1	0.1	0.1						
O	0.6	1.7	---	---						
Trace metal analysis, ppm:										
V										
Cr										
Na										
K										
Ni										
Ca										
Pb										
Cu										
Fe										
Zn										
Al										
Mg										
W										
Ti										

(f) H-Coal (C₄ + liquid) data from ref. 7

Property	Test	Matiliate categories		
		Synctrude from Illinois coal	Low-sulfur fuel oil from Illinois coal	Synctrude from Wyodak coal
Gravity, °API (specific)		15.0	4.4	26.8
Balling range:				
Initial boiling point, °F:				
5 %		C ₄ †	C ₄ †	C ₄ †
10 %				
20 %				
30 %				
40 %				
50 %				
60 %				
70 %				
80 %				
90 %				
95 %				
Final boiling point, °F:				
Pour point, °F:				
Flashpoint, °F:				
Viscosity at	°F			
	61			
	71			
	81			
Ash, wt %				
Ash: 1000 temperature, °F				
Heat of combustion, Btu/lb				
Carbon residue				
Carbon remainder, wt %				
Thermal stability				
Electrical conductivity				
Water				
Bediment				
Neutrality				
Corrosion				

Hydrocarbon type:																				
Sature as																				
Olefins																				
Aromatics, total																				
Aromatics, polynuclear																				
Lanthometer number																				
Analine point, °F																				
H/C atom ratio																				
Elemental analyses, wt%:																				
C																				
H	7.48	8.43	10.54																	
N																				
S	0.68	1.05	0.61																	
O	0.19	0.43	0.16																	
Trace metal analyses, ppm:																				
V																				
Ni																				
Na																				
K																				
MR																				
Ca																				
Pb																				
Cu																				
Fe																				
SI																				
Zn																				
As																				
Mn																				
Mo																				
W																				
Tl																				

TABLE 0. - Continued.

(m) H-Cont distillate blends; data from ref. 32

Property	Test	Distillate categories			
		Sample 76D-1117 (Fuel oil mode)	Sample 76D-3521 (Synctruda mode)		
Gravity, ° API (specific)					
Boiling range:					
Initial boiling point, °F		271	270		
5 %		333	328		
10 %		349	346		
20 %		372	367		
30 %		397	396		
40 %		413	405		
50 %		441	433		
60 %		467	454		
70 %		498	489		
80 %		540	530		
90 %		626	590		
95 %		697	665		
Final boiling point, °F		885	942		
Pour point, °F					
Flashpoint, °F					
Viscosity at	°F				
	nl				
	nl				
	°F				
Ash, wt %					
Ash: melt temperature, °F					
Heat of combustion, Btu/lb					
Carbon residue					
Carbon ramabottom, wt %					
Thermal stability					
Electrical conductivity					
Water					
Sediment					
Neutrality					
Corrosion					

Hydrocarbon type:													
Saturates													
Olefins													
Aromatics, total													
Aromatics, polynuclear													
Luminometer number													
Analyte point, °F													
H/C atom ratio													
Elemental analyses, wt%:													
C													
H	10.14				9.80								
N	0.38				0.38								
S	0.11				0.13								
O	1.20				1.50								
Trace metal analyses, ppm:													
V	0.3				0.1								
Ni													
Na	0.6												
K	0.2												
Mg													
Ca	0.3												
Pb	4.7												
Cu													
Fe													
Si	40.0				12.3								
Zn													
Be													
Mn													
Mo													
W													
Ti	40.0												

Property	Test	Distillate categories			
		Atmosphere overhead (760-920)	Atmosphere overhead (760-921)	Atmosphere bottom (760-922)	
Gravity, ° API (specific)					
Boiling range:					
Initial boiling point, °F		26	20	315	
5 %		160	170	369	
10 %		175	186	391	
20 %		211	213	430	
30 %		262	264	457	
40 %		302	300	486	
50 %		336	332	516	
60 %		363	358	549	
70 %		390	390	581	
80 %		409	409	629	
90 %		446	447	694	
95 %		474	475	740	
Final boiling point, °F		746	568	851	
Pour point, °F					
Flashpoint, °F					
Viscosity at	°F				
at	°F				
at	°F				
Ash, wt %					
Ash: melt temperature, °F					
Heat of combustion, Btu/lb					
Carbon residue					
Carbon remainder, wt %					
Thermal stability					
Electrical conductivity					
Water					
Sediment					
Neutrality					
Corrosion					

Hydrocarbon type:													
Saturates													
Olefins													
Aromatics, total													
Aromatics, polynuclear													
Luminometer number													
Aniline point, °F													
H/C atom ratio													
Elemental analyses, wt%:													
C	86.97	87.19	88.67										
H	11.76	11.99	9.43										
N	0.20	0.20	0.42										
S	0.25	0.26	0.12										
O	1.00	1.00	1.20										
Trace metal analyses, ppm:													
V													
Ni													
Na													
K													
Mg													
Ca													
Pb													
Cu													
Fe													
Si													
Zn													
Ba													
Mn													
Mo													
W													
Ti													

(c) H-Coal Burning Star and Wyodak (synchrado mode): data from ref. 32

Property	Test	Distillate categories			
		Wyodak atmosphere overhead (76D-1013)	Burning Star atmosphere overhead (76D-3019)	Burning Star atmosphere bottoms (76B-2031/3021)	
Gravity, °API (specific)					
Boiling range:					
Initial boiling point, °F		61	71	225	
5 %		162	159	420	
10 %		177	192	440	
20 %		211	251	470	
30 %		249	300	494	
40 %		288	332	516	
50 %		328	361	533	
60 %		358	381	563	
70 %		394	402	588	
80 %		418	432	634	
90 %		468	469	676	
95 %		499	507	722	
Final boiling point, °F		582	608	890	
Pour point, °F					
Flashpoint, °F					
Viscosity at					
at °F					
at °F					
Δsh, wt %					
Δsh; melt temperature, °F					
Heat of combustion, Btu/lb					
Carbon residue					
Carbon zaniabottom, wt %					
Thermal stability					
Electrical conductivity					
Water					
Sediment					
Neutrality					
Corrosion					

(a) Synthoil off-specification run; data from ref. 8

Property	Test	Distillate categories			
		Gross liquified product	Centrifuged liquid product	Centrifuge residue	
Gravity, °API (specific)					
Boiling range:					
Initial boiling point, °F:					
5 %					
10 %					
20 %					
30 %					
40 %					
50 %					
60 %					
70 %					
80 %					
90 %					
95 %					
Final boiling point, °F					
Pour point, °F					
Flashpoint, °F					
Viscosity at					
at					
at					
at					
Ash, wt%		2.7			
Ash: melt temperature, °F					
Heat of combustion, Btu/lb					
Carbon residue					
Carbon ramabottom, wt%					
Thermal stability					
Electrical conductivity					
Water					
Sediment					
Neutrality					
Corrosion					

Hydrocarbon type:								
Saturates								
Olefins								
Aromatics, total								
Aromatics, polynuclear								
Luminometer number								
Aniline point, °F								
H/C atom ratio								
Elemental analysis, wt%:								
C								
H								
N								
S		0.8						
O								
Trace metal analyses, ppm:								
V								
Ni							56	
Na		10			6.6			
K								
Mg								
Ca								
Pb		3.0			1.1		18	
Cu		6.7			2.7		45	
Fe								
Si								
Zn								
Ba								
Mn		31			11		180	
Mo								
W								
Tl								
Cr		15			7.6		86	
Cd		0.19			0.077		1.0	

TABLE 7. - Continued.

(1) Synthol from West Kentucky bituminous coal (5.3 percent sulfur) data from ref. 9ⁿ

Property	Test	4000-psi, 450°C process conditions	Usefulite categories			
Gravity, °API (specific)						
Boiling range:						
Initial boiling point, °F		241				
5 %						
10 %		379				
20 %		413				
30 %		500				
40 %		530				
50 %						
60 %						
70 %						
80 %						
90 %						
95 %						
Final boiling point, °F						
Pour point, °F						
Flashpoint, °F						
Viscosity at						
at						
at						
Ash, wt %		3.4				
Ash: melt temperature, °F						
Heat of combustion, Btu/lb						
Carbon residue						
Carbon ramabottom, wt %						
Thermal stability						
Electrical conductivity						
Water						
Sediment						
Neutrality						
Corrosion						

Hydrocarbon type:	
Saturates	
Olefins	
Aromatics, total	
Aromatics, polynuclear	
Luminometer number	
Absorptive point, ΔF	
H/C atom ratio	
Elemental analyses, wt%:	
C	80.5
H	7.72
N	1.190
S	
O	1.071
Trace metal analyses, ppm:	
V	
Ni	
Na	
K	
Mg	
Ca	
Pb	
Cu	
Fe	
Bi	
Zn	
Ba	
Mn	
Mo	
W	
Ti	

*Report includes tabulated data on percent S and H in products from many hydrogenation runs. Maximum hydrogenation pressure was only 1500 psi, so S and H reductions were not large. Typical percent reductions are (a) at 1.5 hr^{-1} max. N reduction, 23 percent; max. S reduction, 74 percent; (b) at 3 hr^{-1} max. N reduction, 46 percent; max. S reduction, 98 percent.

TABLE 7. - Continued.

(c) Synthol (filtered, centrifuged, and upgraded distillate); data from ref. 3

Property	Test	Distillate categories			
		Centrifuged (3296-109)	Filtrate (3296-143)	Washed filtrate (3296-147)	Upgraded distillate (3392-63(p48))
Gravity, °API (specific)		-5.7 (1.1248)	-3.5 (1.1055)	-4.3 (1.1126)	9.5 (1.0035)
Bolting range:	D-1160				
Initial bolting point, °F		395	407	455	463
5 %		470	480	519	543
10 %		510	515	552	565
20 %		579	518	606	603
30 %		642	635	665	636
40 %		700	697	730	670
50 %		762	760	795	701
60 %		845	842	865	735
70 %		945	951	970	774
80 %					812
90 %					863
93 %					901
Final bolting point, °F					950
Four point, °F			70	75	
Flashpoint, °F					
Viscosity at 175 °F, cS		135			
at 210 °F, cS		43.65	34.25	56.20	
at 250 °F, cS		16.84	14.08	18.73	
Ash, wt %		1.40	0.02	0.015	0.06
Ash: melt temperature, °F					
Heat of combustion, Btu/lb					
Carbon residue					
Carbon remainder, wt %					
Thermal stability					
Electrical conductivity					
Water					
Sediment					
Neutrality					
Corrosion					