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Tom 132 748

Item 17

Tables of data dated November 1933 on requirements of Alkazid-process for utilities, equipment, solutions, operating personnel, etc.

Table 1

Utilities consumption and requirement for operating personnel for the Alkazid-process

(appendix to the tables: Scrubbing volume and volume of the Alkazid solution required for the purification of the compressed hydrogenation gas to 10 g S/m<sup>3</sup>/1000 kcal. and for the purification of the hydrogenation fuel gas to 0.5 gS/m<sup>3</sup>/1000 kcal).

Furnace chamber	Electric current kw/hr.	Cooling water m <sup>3</sup> /hr.	Steam total cons. to	Generation to claus kiln	Additional steam	Operating personnel for claus
1.5	-	-	1.00	0.72	0.28)	2x4 kiln
2.5	15	35	2.22	1.12	0.40)	2x4 scrubbing
3.5	22	55	2.43	1.86	0.55)	1x4 supervisi
4.5	31	80	3.37	2.36	1.01)	1 foreman
5.0	37	100	4.00	2.71	1.29)	1 chemist
22						
6.0	48	120	4.59	3.32	1.57)	2x4 for claus kil
7.0	53	150	5.80	3.93	1.87)	3x4 " scrubbing
8.0	62	175	6.76	4.50	2.26)	1x4 supervision
9.0	71	200	7.72	5.15	2.57)	1/2x4 foremen
10.0	84	235	8.85	5.79	3.06)	1/2x4 chemists
29						

The foremen and chemists have only a parttime occupation at the Alkazid plant, they are employed for the sulfuric acid plant too.

Table 2  
 Scrubbing volume and volume of the Alkaid-solution required for the purification of the compressed hydrogenation-gas to 10 g S/m<sup>3</sup>/1000 kcal.

Furnace chamber	Content of the Compressed gas		Actual m <sup>3</sup>	1000 kcal +)	remaining H <sub>2</sub> S in the actual gas		Extracted from the gas		Total sulfur		Required vol. of Alkaid sol. l. = 20-25 capacity vol/vol m <sup>3</sup>
	Hy-gas (CO <sub>2</sub> +F <sub>2</sub> S) vol. %	F <sub>2</sub> S vol. %			H <sub>2</sub> S % vol.	CO <sub>2</sub> % vol.	Total vol. % vol.	kG/hr. ton per mo.	Total sulfur kG/hr. ton per mo.	Required vol. of Alkaid sol. l. = 20-25 capacity vol/vol m <sup>3</sup>	
1.5	5.15	5.0	4,260	34,500	(6.07)	-	-	-	-	-	-
2.5	7.61	5.57	6,000	45,900	(5.75)	-	-	-	-	-	-
3.5	8.74	5.88	7,740	57,300	5.55	0.33	0.3	0.6	33.9	24	2.3-1.8
4.5	9.46	6.07	9,460	68,720	5.44	0.63	0.6	1.2	79.4	57	5.7-4.5
5.0	9.75	6.15	10,500	75,500	5.40	0.75	0.8	1.6	163	76	8.4-6.7
6.0	10.16	6.26	12,220	86,600	5.36	0.90	0.9	1.8	220	105	11.0-8.8
7.0	10.45	6.34	13,920	98,200	5.29	1.05	1.0	2.0	278	141	13.9-11.2
8.0	10.68	6.40	15,610	109,300	5.25	1.15	1.1	2.3	359	173	17.9-14.4
9.0	10.86	6.46	17,420	121,400	5.22	1.24	1.2	2.4	419	208	20.9-16.8
10.0	11.01	6.50	19,100	132,500	5.20	1.30	1.3	2.6	496	238	24.8-19.3
									496;20 = 24.8		
									496;25 = 19.9		

+) Communication of the Hydrogenation Division  
 Nov. 13, 1933

10,000:750 = 25.5

Table 3  
Purification of the Hydrogenation Fuel-gas to 0.5 g S/m<sup>3</sup>/1000 kcal.

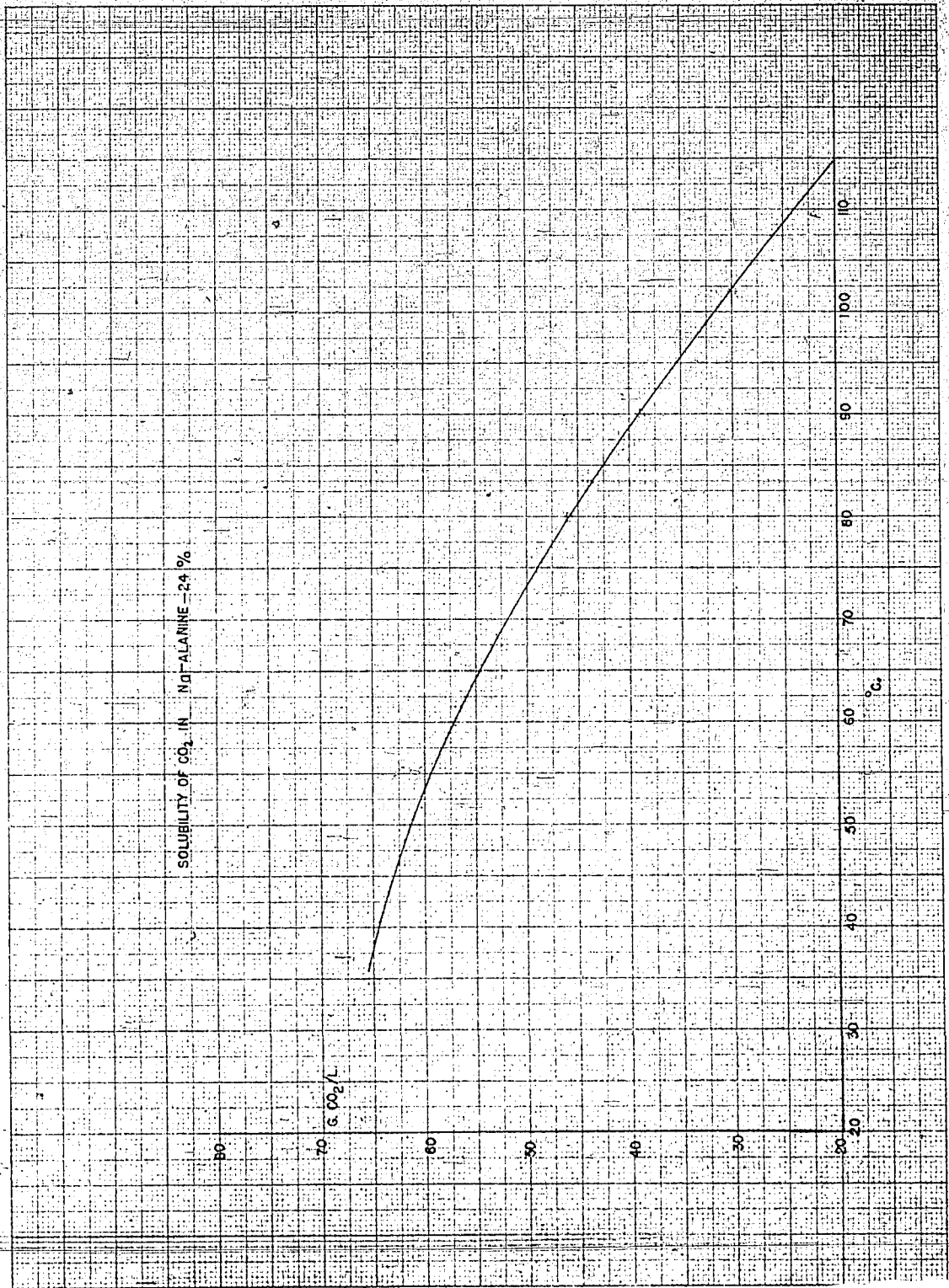
Furnace chamber	Percent of the Hydrogenation Gas		Actual m <sup>3</sup>	Fuel Gas m <sup>3</sup>	H <sub>2</sub> S remaining in the actual gas		Extracted from the gas		Total vol. % vol. m <sup>3</sup>	Rec. Sulfur kg/hr	Total Sulfur from fuel-gas and compr. gas ton/month	Required vol. of sol. per hr. 1:20-25 vol/vol m <sup>3</sup>	Required capacity of the scrubber 1 : 500 m <sup>3</sup>
	H <sub>2</sub> S vol. % +)	CO <sub>2</sub> vol. % +)			H <sub>2</sub> S % vol.	CO <sub>2</sub> % vol.	Total vol. % vol.	Total vol. m <sup>3</sup>					
1.5	5.0		3,740	30,300	0.30	4.7	2.4	7.1	266	168	13.3-10.6	7.5	
2.5	5.57		5,460	41,700	0.26	5.29	2.6	7.9	432	276	21.6-17.3	10.0	
3.5	5.74		7,160	53,100	0.25	5.60	2.0	6.4	602	414	30.1-24.1	14.3	
4.5	6.07		8,920	64,500	0.27	5.80	3.0	8.8	784	494	39.2-31.4	17.8	
5.0	6.15		9,900	71,300	0.27	5.83	3.2	9.1	900	556	45.0-36.0	19.6	
6.0	6.26		11,680	82,700	0.26	6.00	3.3	9.3	1085	670	54.2-43.4	23.4	
7.0	6.34		13,380	94,100	0.26	6.08	3.4	9.5	1270	777	63.5-51.0	26.8	
8.0	6.40		15,090	105,500	0.26	6.14	3.5	9.6	1450	1060	72.5-58.0	30.1	
9.0	6.46		16,780	116,900	0.26	6.20	3.6	9.8	1640	1203	82.0-65.6	33.6	
10.0	6.50		18,600	128,300	0.25	6.24	3.7	10.0	1860	1353	93.0-74.5	37.2	

+) Communication of the Hydrogenation Division, Nov. 13, 1953

Table 4  
Scrubbing volume and volume of the Alkaid solution required for the purification of the compressed hydrogenation gas to 10 g S/m<sup>3</sup>/1,000 kcal.

Purification chamber	Content of the hydrogenation gas		Compressed gas m <sup>3</sup> /hr.	H <sub>2</sub> S left in the gas		Extracted from the gas		Total vol. m <sup>3</sup>	Recovered kg/hr	Sulfur tons per month	Required vol. of Alkaid sol. per hr. 1:20-25 vol/vol. m <sup>3</sup>	Required scrubber 1:75C capacity m <sup>3</sup>
	CO <sub>2</sub> % vol.	H <sub>2</sub> S % vol.		H <sub>2</sub> S % vol.	CO <sub>2</sub> % vol.	H <sub>2</sub> S % vol.	CO <sub>2</sub> % vol.					
1.5	5.0	-	-	5.2	1.2	1.0	2.2	140.3	-	-	7-5.6	8.5
2.5	9.2	6.4	6,400	4.8	2.4	1.0	3.4	284	102	73.4	14.2-11.4	11.2
3.5	11.5	7.2	8,350	4.5	3.2	1.0	4.2	454	269	135.7	22.7-18.0	14.4
4.5	12.4	7.7	10,300	4.4	3.3	1.3	4.6	556	464	334	27.8-22.0	16.1
5.0	12.9	7.7	12,070	4.4	3.6	1.3	4.9	696	532	385	34.8-28.0	19.3
6.0	13.5	8.0	14,225	4.4	3.9	1.5	5.4	936	682	491	44.3-35.4	21.8
7.0	14.0	8.2	16,380	4.3	4.0	1.5	5.5	1012	853	614	50.6-40.5	24.6
8.0	14.4	8.3	18,440	4.3	4.1	1.7	5.8	1195	975	702	60.0-48.0	27.5
9.0	14.6	8.3	20,650	4.2	4.2	1.7	5.9	1339	1139	820	67.0-53.0	30.2
10.0	14.9	8.4	22,700	4.2	4.2	1.7	5.9	1339	1271	964	-	-





## Ref. Alkazid process

With reference to your letter dated October 12, 1933 we are transmitting to you the desired data submitted by the Girdler corporation concerning the extraction of CO<sub>2</sub> from the exhaust gases of a combustion engine. The offered plant has a capacity of 1,400 cu. ft. per hour.

Design Data for Treating 1400 cu. ft./hour gas  
to remove 14% to 0.2% CO<sub>2</sub>

1. Quantity of Gas to be treated:		
max. cu. ft. per minute	23	23.3
max. cu. ft. per hour		1400
max. cu. ft. per day (24 hours)		33600
2. Quantity CO <sub>2</sub> to be removed:		
max. cu. ft. per minute		3.5
max. cu. ft. per hour		198.
max. lbs. per minute		0.396
max. lbs. per month (26 days = 8 hours)		4930.
max. lbs. per hour		23.7
3. Gas pressure, lbs. per sq. in. gage		65.
4. Gas pressure, mm Hg. absolute, min.		4085.5
5. Gas temp. as delivered for processing °F. max.		950°F.
6. Specific gravity of gas, air equals one.		1.00
7. H <sub>2</sub> S content, inlet, grains per 100 cu. ft.		none
8. CO <sub>2</sub> content, inlet, volume percent		14.0%
9. CO <sub>2</sub> " outlet " " max.		0.2%
10. C <sub>2</sub> content, inlet, " " max.		1.5%
11. Hydrocarbons, hydrogen, nitrogen, CO, vol. %		present
12. SO <sub>2</sub> and SO <sub>3</sub> v.p.; i.e. percent. max.		none
13. Aldehydes, strong acids, salts of alkali and alkaline earths and C <sub>2</sub> H <sub>2</sub>		none
14. Dust in gas, grains per cu. ft.		0.01
15. Steam, pressure at plant, min. lbs. gage	5# - can have 125#	
16. Steam, superheat at plant, °F.		750°F. 130# max.
17. Water, pressure at plant, lb/sq. in. gage, min.		55#
18. Water, temperature, delivered to plant, °F. max.		700°F.
19. Water, total solids, p.p.m.		present
20. Atmosphere, barometric pressure, mm., min.		724
21. Electric current, voltage		220
22. Electric current, phase		3
23. Electric current, cycle		60

Consumption Data

40# per hour steam  
180 gal. Water  
1/2 H.P. Current  
Girbotol 5/100 # or less per hour.