

16	Chips	52	16.5	43.4	60	8:00	519	0.464	1.07
17	H.M. Chips	34	18.3	27.8	60	8:00	596	0.209	0.75

¹ On the wet basis

² On the oven-dry basis

³ Chips - Conventional 1/2-inch pulp chips

⁴ H.M Chips - hammer-milled chips

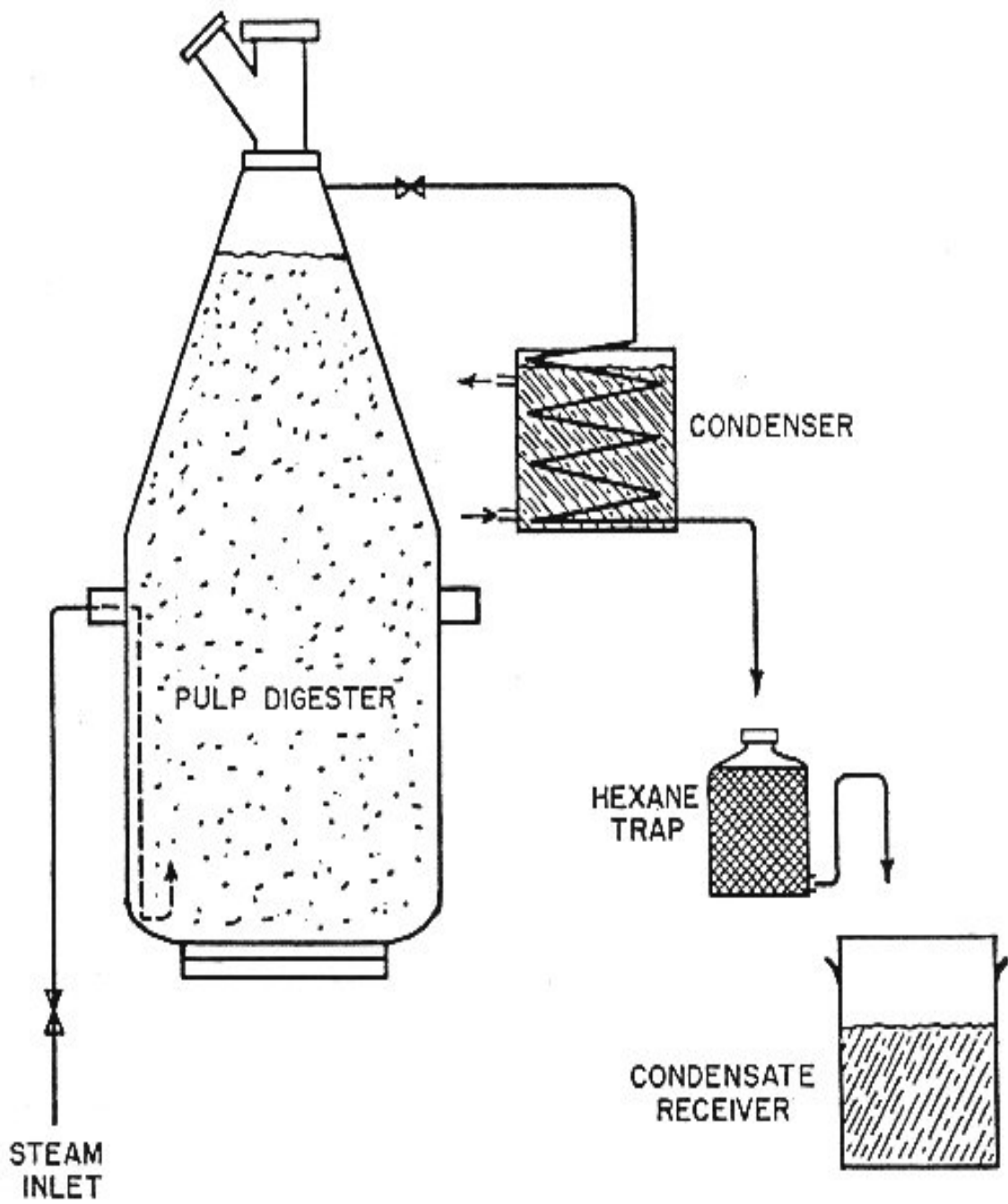


FIGURE 1. STEAM DISTILLATION APPARATUS.

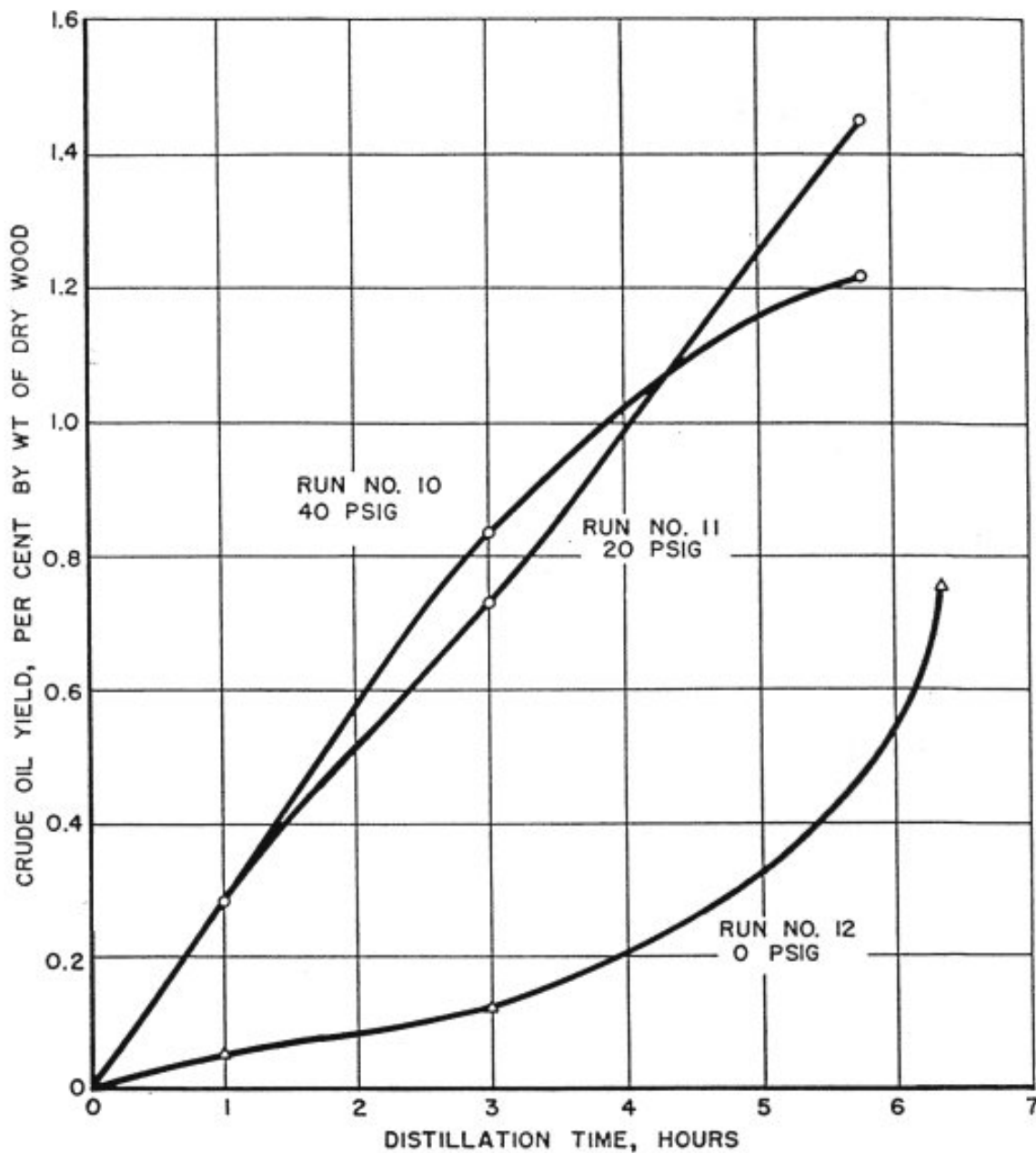


FIGURE 2. RATE OF STEAM DISTILLATION OF CRUDE JUNIPER-WOOD OIL.

Table 4. Rate of Steam Distillation

Run	Dry wood	Steam pressure	Oil Recovered			Overall yield
	Lb		Psi	Lb	Lb	Lb
10	28.4	30	0.082	0.155	0.113	1.23
11	25.5	20	0.073	0.114	0.18	1.45
12	26.6	0-1	0.0154	0.0187	0.168	0.76

¹Ovendry weight basis
Rate curves for these runs are shown in Figure 2.

		Lb	Percent ²	Lb	psi	Hours	Lb	Percent	Lb/lb
1	hm-wob	57.5	44.0	32.1	50	6.5	0.53	1.65	240
2	hm-wb	52.0	46.0	28.1	50	5.75	0.353	1.26	246
3	hm-wob	44.0	37.5	27.4	50	3	0.398	1.46	126
4	hm-wb	48.0	43.0	27.4	50	3.75	0.34	1.24	246
5	hm-wb	40.0	37.0	25.0	10	7	0.345	1.38	385
6	chips-ns-wob	39.0	45.0	21.4	10	7	0.187	0.88	700
7	chips-ns-wob	49.0	36.5	31.0	50	7	0.358	1.16	328
8	chips-ns-wb	42.0	43.0	23.9	30	7	0.230	0.96	505
9	chips-s-wob	42.0	41.5	25.8	30	4	0.274	1.07	224
10	chips-s-wb	39.0	41.5	22.8	50	3.33	0.176	0.78	305
11	chips-s-wob	44.0	38.5	27.0	50	3	0.313	1.16	144
12	chips-s-wob	46.0	40.5	27.4	50	3	0.30	1.10	146
13	chips-s-wob	41.0	39.5	24.8	10	8	0.15	0.61	2060
14	chips-ns-wb	49.0	37.5	30.5	50	4	0.39	1.28	118
15	trash chips	33.0	35.0	21.5	10	4.5	0.172	0.80	495

¹ hm - hammer-milled
wob - without bark
wb - with bark
ns - not screened
- screened

² On a wet-weight basis

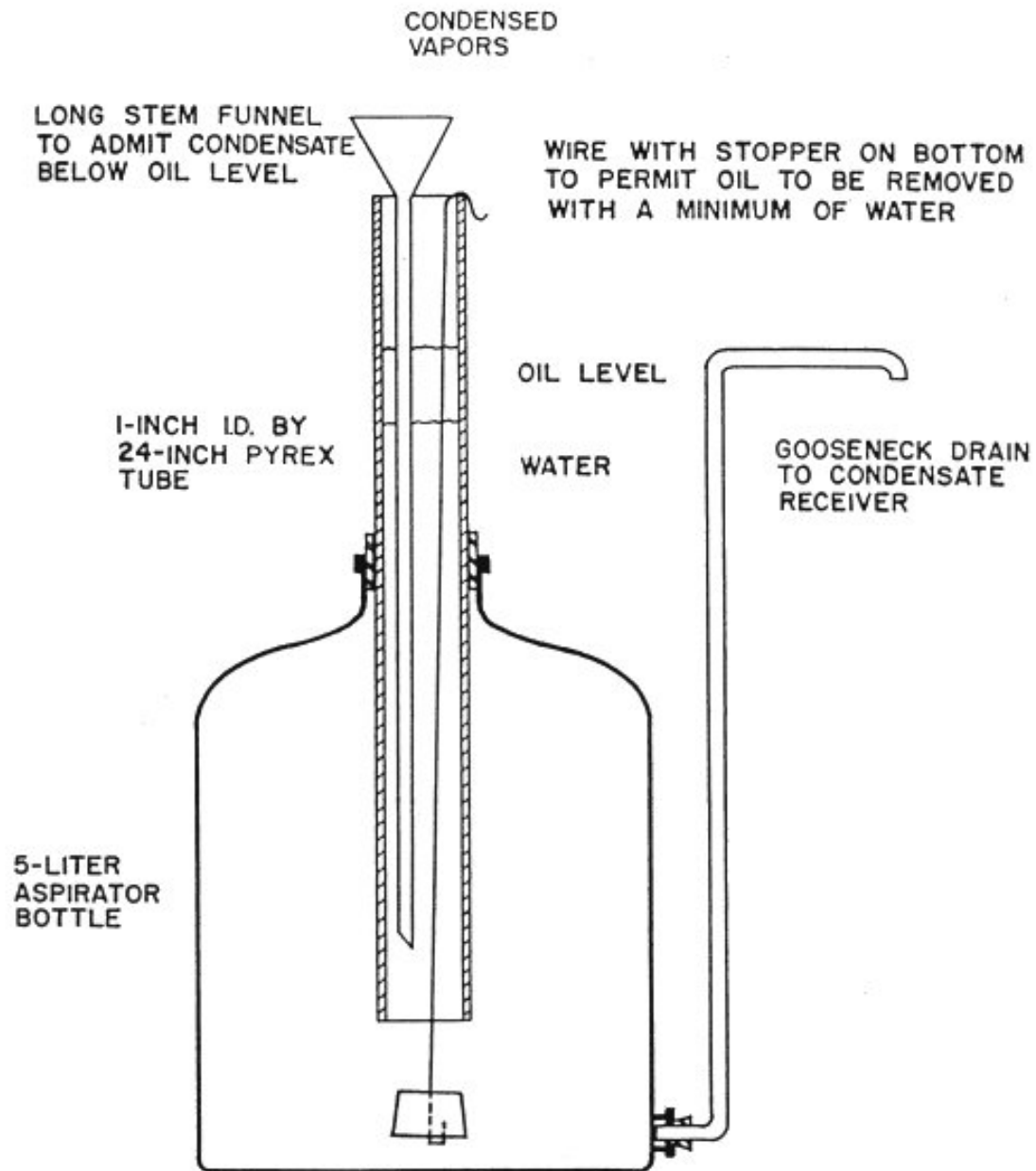


FIGURE 3. SKETCH OF OIL TRAP.

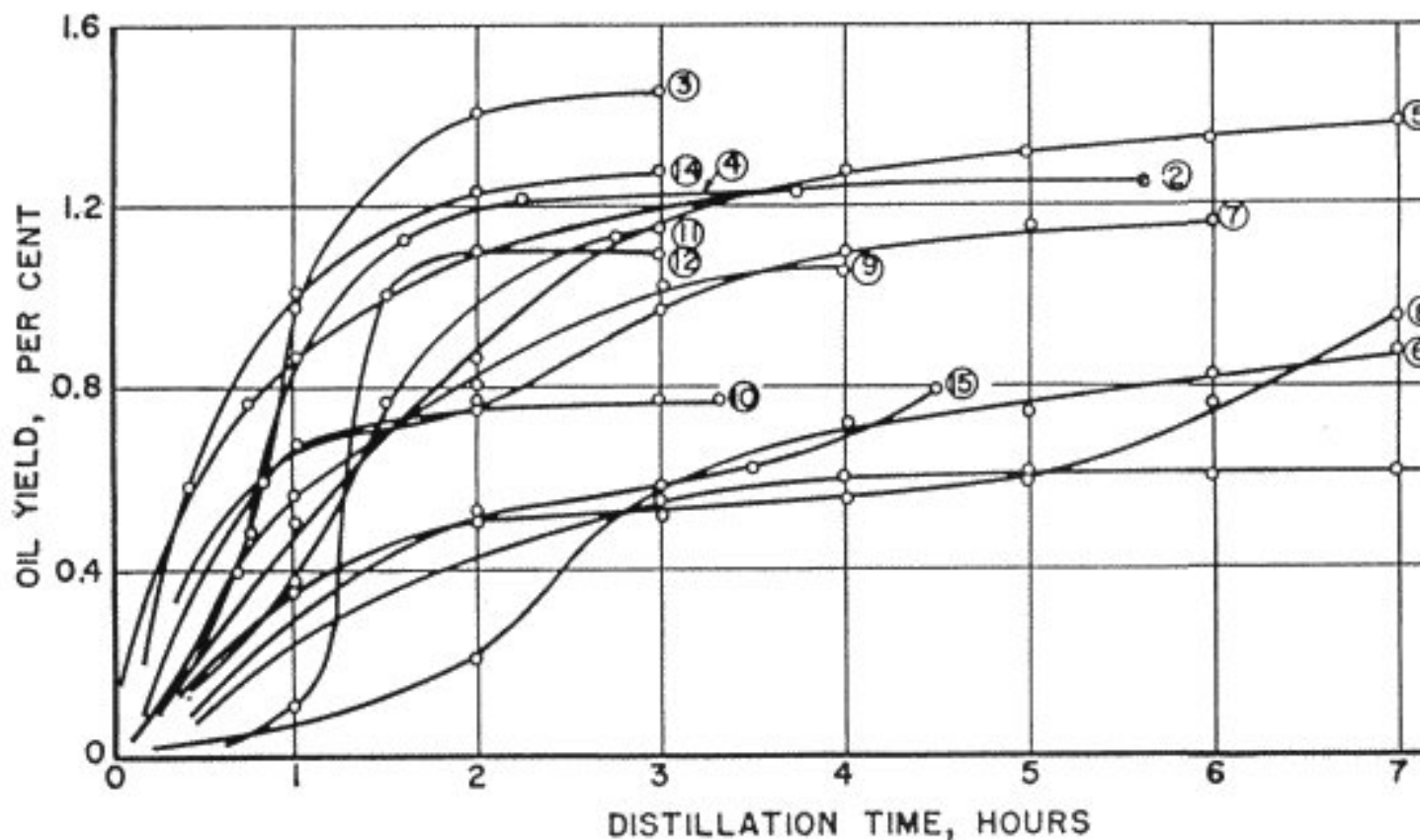


FIGURE 4. RATE OF OIL RECOVERY DURING STEAM DISTILLATION OF W JUNIPER WOOD; ON A DRY-WEIGHT BASIS.

A number of samples, when exposed to air for several days, developed a dark blue-green color, apparently because of copper contamination from the condenser. This color was removed by treatment with citric acid as described by Guenther (1949, p. 311 Vol. I).

Oils obtained from runs using 10 psi steam pressure and less deposited cedrol crystals on standing overnight. Samples of oil from runs 5 and 6 reacted in this manner. Filtration of the samples showed 17.4 percent of the weight of oil deposited as cedrol in run 5, and 10 percent from run 6. The other low pressure runs, 13 and 15, did not give crystalline cedrol. Run 13 used a high excess of steam which resulted in partial emulsification of the oil and water which seemed to inhibit crystallization. Run 15 used waste wood with considerable bark, and this did not deposit crystalline cedrol.

The oils from high-pressure runs, when treated by the Raybak process (Guenther, 1949, p. 300 Vol I) yielded about 20-25 per cent of the weight of oil as crystalline cedrol.

A number of random treatments of the oil were tried in an effort to improve the odor of the oil as requested by the John D. Walsh Co, 32 Broadway, New York, New York.

Samples treated in the following manner were sent to this firm for examination:

- 1. Crude oil as recovered, not treated.
- 2. Oil extracted with citric acid to remove heavy metals.
- 3. Oil extracted with (1) citric acid and (2) with hot, saturated, sodium bisulfite solution.
- 4. Oil refluxed with 5 percent sodium hydroxide solution.
- 5. Oil extracted with 10 percent hydrochloric acid.

Operating Pressure		Temperature		Vapor pressure of water	Temp from Duhring plot	Vapor pressure of cedrol
Psig	Lb abs	Deg F	Deg C	mm Hg	Deg C	mm Hg
0	14.7	212	100	760	-27	0.6
10	24.7	239	115	1275	-13	1.7
20	34.7	259	126	1790	-4	3.4
30	44.7	274	135	2310	1.2	5.0
40	54.7	286	141	2830	8	8.05
50	64.7	297	148	3340	12.5	10.9
60	74.7	307	153	3860	16	13.6
80	94.7	324	162	4900	21	18.7
100	114.7	338	171	5930	26.5	25.9

Calculating theoretical steam required to distill cedrol, using conventional steam distillation equation:

$$\frac{\text{Weight Water}}{\text{Weight Cedrol}} = \frac{P_w (MW_w)}{P_c (MW_c)}$$

$MW_w = 18$ (molecular weight of water)

$MW_c = 222.4$ (molecular weight of cedrol)

P_w = vapor pressure of water

P_c = vapor pressure of cedrol

Partial pressure of cedrol was neglected in the lower range.

At pressures up to 100 psi, steam required is as follows:

Pressure	Steam required
Psi	Lb/ lb cedrol
0	102.5
10	60.6
20	42.5
30	37.3
40	28.3
50	24.7

60	22.9
80	21.1
100	18.4

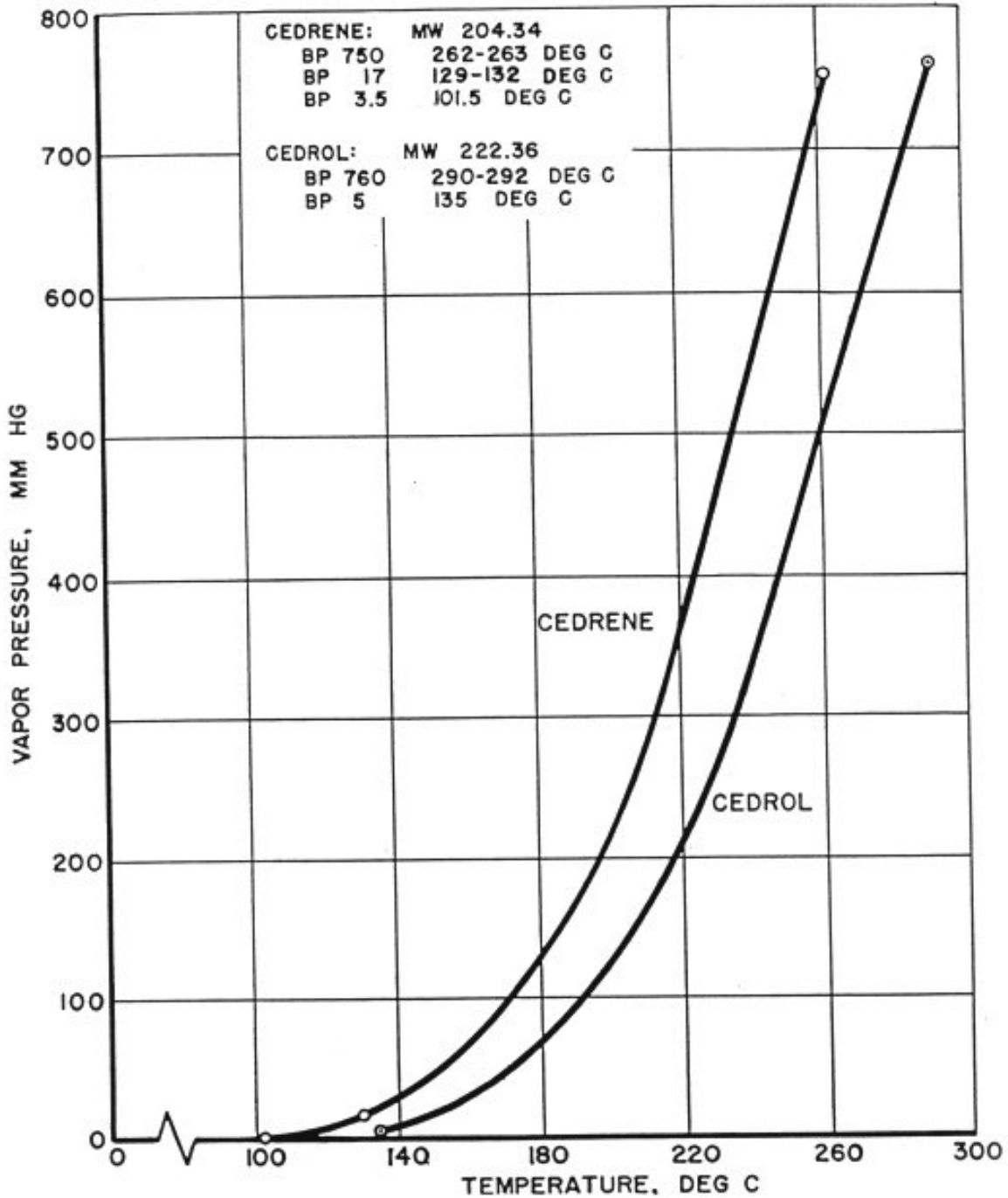


FIGURE 5. VAPOR PRESSURES OF CEDROL AND CEDRENE (GUENTHER, II, PP. 118, 285).

