It has been found that volatility and specific gravity are the most valuable physical constants for use in determining the nature of a

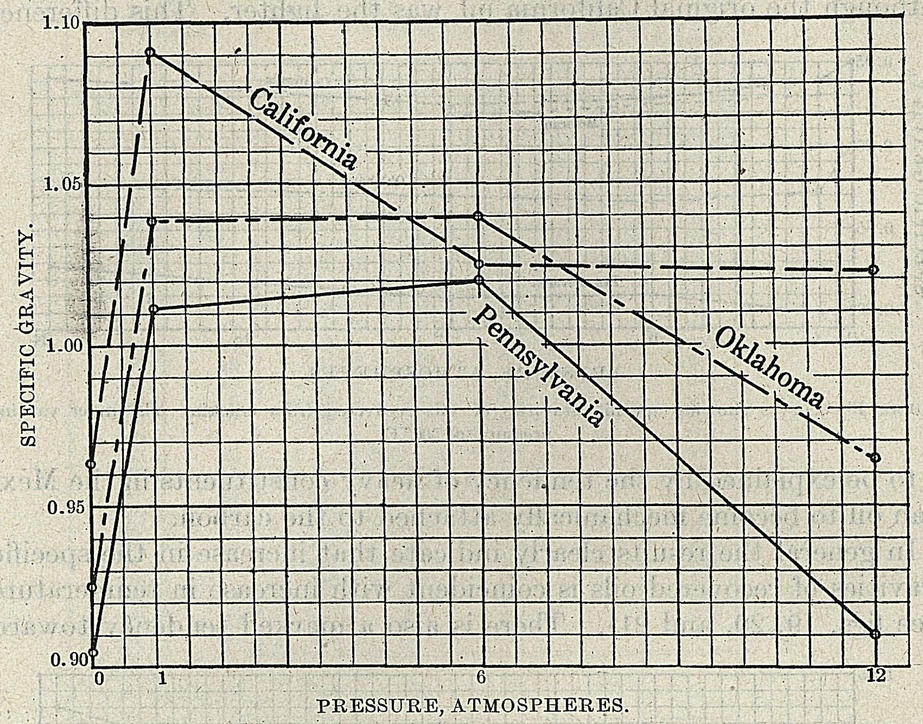

FIGURE 21.—Curves showing specific gravities of oils recovered from cracking oils under varying pressures at 750° C.

given oil. The specific-gravity method of determining yields of desired products in the recovered oils which has given satisfactory

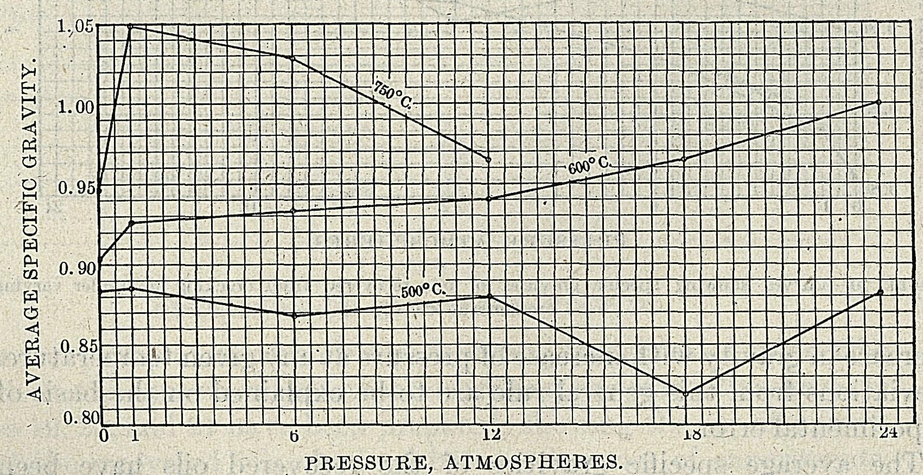

FIGURE 22.—Curves representing average results of cracking oils, and influence of varying temperatures and pressures on specific gravities of oils recovered.

results has been developed through experimental research extending over a period of years. The application of the method is more fully

discussed subsequently. The method has been checked with nitration methods of analysis, and has been found dependable. It is as reliable as any analytical method, and is particularly useful in the quantitative determination of the aromatic hydrocarbons in a given oil. The values assumed for calculating yields have been experimentally checked and proved to be accurate. The chief recommendations of the method are the greater facility of making determinations and its accuracy.

VISCOSITY OF OIL RECOVERED.

In a number of the experiments the quantity of oil recovered was so small that viscosity measurements could not be made.

The values that were obtained are given in Table 16. The most noticeable feature in connection with these figures is the fact that, although the original oils differ widely in viscosity, the figures for a given temperature and pressure show only slight variations. This is one of the facts that tend to establish the conclusion that the conditions under which an oil is treated are of much greater influence than the physical and chemical properties of the oil. For example, the ratio of viscosity between the Pennsylvania water-white distillate and the Kern River crude was approximately 1 to 35, whereas the average viscosity ratio for the recovered oils from the two sources was less than 1 to 3. At pressures above 1 atmosphere this ratio was approximately 1 to 1.5.

The table shows that for temperatures up to 750° C. the viscosity decreases with temperature and pressure. Experimental evidence obtained at higher temperatures proves that there is a progressive increase in viscosity at temperatures of 800° C. and above. Table 16 follows:

TABLE 16.—*Results of cracking five oils, showing viscosities of oils recovered.*

Furnace conditions.		Viscosity of recovered oil from original oil from—				
Temperature.	Pressure.	Pennsylvania.	Oklahoma.	California.	Mexico.	Russia.
° C.	*Atmospheres.*					
800	(a)	.....	1.64	3.95	.....	.....
750	(a)	1.04	1.44	.....	2.70	.....
600	12	1.11	1.48	1.79	.....	.....
600	6	1.00	1.08	1.15	.....	.....
600	1	.....	1.27	1.98	1.96	.....
600	(a)	1.04	7.29	.....	6.73	.....
550	24	.....	1.05	.....	.....	.....
500	24	.97	1.25	1.35	.....	.....
500	18	.96	.....	.....	.....	.....
500	12	.98	1.32	1.35	1.15	1.44
500	6	1.00	1.54	1.52	.....	.....
500	1	1.00	2.51	6.16	1.88	.....
500	(a)	1.04	13.42	.....	.....	.....
450	18	.....	1.50	2.71	.....	.....
450	12	1.02	1.73	.....	4.43	.....
400	10	.....	.....	.....	.....	.....
Vicosity of original oil		1.05	35.40	35.70	Over 350	11.92

a Vacuum.