# APPENDIX.

## Distillation Tests of Crude Petroleum and its Products.

*Crude Petroleum.* Many methods of distillation are in common use, the most important of these being as follows:—

A. The Ubbelohde continuous method. 100 c.c. of the oil is distilled at a uniform rate, from a distillation flask of approximately the same dimensions as the standard Engler flask, by the continuous application of heat; the various fractions being collected between specified temperatures.

B. The Engler intermittent method. 100 c.c. of the oil is distilled from a glass distillation flask of specified dimensions (about 150 c.c. capacity). When the thermometer indicates the maximum temperature for the first fraction, the source of heat is removed and the temperature allowed to fall at least 20°C., the flask is then reheated to the maximum of the fraction. This process is repeated until practically no more distillate is obtained. The succeeding fractions are collected in like manner.

C. The Hempel continuous fractionation method. 100 c.c. of the oil is distilled from a flask with a fractionating column attached. The column is filled with beads, preferably aluminium, and the distillation is carried out at a uniform rate by continuous heating.

A crude oil, especially when it contains a notable amount of water, may give so much trouble with bumping and frothing that it is impossible to make a regular test on the original sample. It is then customary to make a preliminary distillation, preferably under reduced pressure at the higher temperatures, and redistil the distillate in the regular way. The results are not strictly comparable with those on original samples.

The following table[1] illustrates the discrepancies between the results obtained with two of the above methods:—

TABLE I.

| Method. | A. Continuous. | B. Intermittent. |
|---|---|---|
| To 150° C. | 5·2 | 9·5% by volume |
| 150°–300° C. | 32·3 | 32·7 |
| Above 300° C. | 56·0 | 52·9 |

From theoretical reasons it is clear that wide discrepancies must occur between the results of the different methods and the actual composition of the mixture distilled. Method C normally gives the closest results, but is little used and has less claim than the others to be regarded as standard. Method B generally gives closer results than A, especially for the lower fractions, but is very slow. Method A gives more concordant results between duplicate tests. In some cases neither B nor C can be used on account of the low temperature at which "cracking" begins. "Cracking" is the name given to the decomposition by heat of hydrocarbon or other compounds into new bodies of lower molecular weight and

[1] Rittmann & Dean: The Analytical Distillation of Petroleum, U.S. Bureau of Mines, Bul. 125, p. 8.