

I had hoped to be able to make use of the difference between the refractive indices of the first fraction, and the residual tenth, but this number varies so much in consequence of the ageing of the sample, that it does not appear to be available for analytical purposes. The absolute magnitude of the refractive index for the residual tenth is a good indication of the extent to which the sample has undergone oxidation, or to which rosin oil, or similar adulterant or high specific refraction, has been added. In genuine samples, which have not been unduly exposed to air, it should apparently not exceed 1.4850. The difference between the refractive indices of the first and last fractions of normal samples is therefore about 0.0180. There are, however, several notable exceptions among the samples tabulated (see Nos. 9, 31 and 46) and it is worthy of remark that, although two of these samples are passed as probably genuine upon the whole results of analysis, their specific gravity is exceptionally low. The indications of the difference column must evidently be interpreted in conformity with the reading of the first fraction. Where this is abnormally low, (see No. 59) the number in the difference column considered by itself, may be misleading.

Spiritine (No. 54) behaves very like turpentine in regard to refraction. Other adulterants are characterised by much higher (rosin oil) or much lower refraction numbers. (See 53, 59, 63.)

15. *Fluorescence*.—I have not been able to make the fluorescence of petroleum serviceable for its detection or estimation in presence of oil of turpentine. Mr. Kenrick has recorded a blue fluorescence in samples 17330, 17331, 17332, 17333. These samples he considers genuine.

16. *Oxidizability*.—The property of taking up atmospheric oxygen with the formation of resinous products of higher gravity and boiling point than oil of turpentine itself, naturally affects the sample in these two particulars, as has already been mentioned under Sections 5, 6 and 7. Engler (2) states that half of the oxygen at first absorbed is in the active condition, and subsequently performs intramolecular oxidation.

The ready polymerization and conversion of oil of turpentine into soluble compounds under the influence of strong sulphuric and nitric acids has been proposed for the quantitative separation and estimation of petroleum adulterants which are but little influenced by these oxidants.

The use of sulphuric for this purpose seems to have been suggested by H. E. Armstrong (1.) The sample is treated with sulphuric acid and the portion unacted upon is distilled off in a current of steam. This is treated a second time, and, if necessary, a third and fourth time, till the acid has no further effect upon the material. I have found the process fairly satisfactory, but very tedious, and not suited for the practical examination of commercial samples, where time is a consideration.

Oxidation by fuming nitric acid has been proposed by Burton (1.) In my hands it has not proved a success. If the temperature be allowed to rise, there is certainty of loss of material, and if it be kept down, as recommended, by immersion of the decomposing flask in water, the reaction does not occur with regularity or certainty, and the addition of turpentine cannot be regulated so as to prevent violent and dangerous explosions. It may be that further experience would over-

(1.) Jour. Chem. Soc., 1890, 99.

(2.) Abst. in Jour. Soc. Chem. Indus. 1900, 682.

(1.) Amer. Chem. Jour., 12, 102.