ABSTRACTS

Polymerisation of Fatty Oils. V. J. Marcusson (Z. angew. Chem., 1926, 476-478; cf. B., 1925, 889). Linseed oil films contain about 55 per cent of solid polymerised and oxidised gel and 40 per cent of polymerised and oxidised sol with 5 per cent unchanged oil. Poppyseed oil films contain 51 per cent of insoluble gel (mol. wt. 707), 31 per cent of easily gelatinesed sol containing 40 per cent of unpolymerised fatty acids and a variable amount of acids of mol. wt. 420, and 18 per cent of unchanged oil. The acetone-insoluble gel of tung oil films (83 percent) contains a unimolecular, oily product soluble in furfuraldehyde and having a mol. wt. of over 100 by Rast's camphor method. During the drying of tung oil, isomerisation due to the action of light first takes place, followed by polymerisation and oxidation. The halogens and sulphur have a similar action to light in that at 10° they precipitate B-elaeostearin and at room temperature a solid polymerisation product. For the detection of tung oil in mixtures 5 g. of the oil are shaken with 5 c. c. of a cold saturated solution of iodine in chloroform; with high percentages of tung oil a gelatinous mass is obtained but with 15-20 per cent of tung oil the mixture must be warmed on the water-bath. No other fatty oil behaves similarly. A rough quantitative test may be made by extracting the reaction product with chloroform in Graefe's apparatus, removing the iodine by shaking with thiosulphate, distilling off the chloroform, drying, and weighing.

Action of Sulphur on Linseed Oil. G. S. Whitby and H. D. Chataway (J.S.C.I., 1926, **45**, 115-121T.). To samples of 20 g. of raw linseed oil definite amounts of sulphur up to 16.5 per cent were added with agitation and exclusion of air, and at temperatures maintained accurately at 160° (or 170° in some cases), samples being withdrawn at intervals prior to setting and the amount of acetone-insoluble fraction determined. In all cases after heating for 45 min. at 160° all the sulphur added had combined with the oil. Results are given for time of setting and for the concentration of acetone-insoluble material at the moment of gelation. The proportion of sulphur in combination with the oil was always higher in an acetone-insoluble than in a corresponding acetone-soluble fraction. In the action of sulphur and heat on drying oils three well-defined stages succeed each other, viz., chemical combination of sulphur with the oil which takes place comparatively quickly, followed by the formation of an acetone-insoluble product in the second stage, a gradually increasing proportion of the oil changing to a more viscous liquid insoluble in cold acetone. This change is apparently polymerisation, the speed of which is greater, the greater the amount of sulphur present and the higher the temperature. Finally, gelation takes place, and it is presumed that during heating the acetone-insoluble material gradually assumes colloidal dimensions and this colloidal material imbibes the acetone-soluble liquid and any portion of the acetone-insoluble liquid still non-colloidal and a gel then appears rather suddenly. The closely related phenomena of the "drying" of oils and of their thickening under the influence of heat are shown to be similar to the setting of oils under the influence of sulphur and heat.

Effect of "Blowing" on the Composition of Certain Fatty Oils. C. H. Thomson (Analyst, 1926, **51**, 177-180). The effect of "blowing" at different stages has been examined in the case of cotton seed, whale, sperm, and shark oils, the oils being treated on the large scale, in quantities of about 4 tons, at 115°. Samples were taken at different stages and the specific gravity, viscosity at 93°

(Redwood), and the usual constants and variables were determined. Methylated ether was the solvent used to extract the unsaponifiable matter. Tabulated results indicate that iodine value and unsaponifiable matter fall during the oxidation, while specific gravity, viscosity, saponification value refractive index, and free fatty acids (as oleic) rise to a greater or less extent. Although the constants and variables rise or fall simultaneously at each stage they do so at the same rate. The rise in saponification value is concurrent with the fall in unsaponifiable matter, the increase in acid value being apparently partly due to the oxidation of the unsaponifiable alcohols to fatty acids. Ether-insoluble bromides are not produced from blown shark, whale, or sperm oils, though they are given by the untreated oils. There is practically a regular rise in the viscosity and refractive index after the oil reaches a viscosity of 700 sec., and up to 1800 sec., but below 700 sec. the relationship is irregular. The various changes caused by "blowing" are brought out clearly in a table giving the analysis of the saponified oils. The amount of glycerol produced is not affected but a considerable quantity of apparently neutral organic matter is formed. Similarity in conditions of blowing must be observed to obtain similar results—the changes in composition are in the same direction as the blowing is continued. In the case of sperm oil blowing was also carried out with the addition of 0.1 per cent of cobalt oxide and certain anomalies were noted.

Chemical Reactions in Fat Hardening. W. Normann (Z. Deuts. Oel-u, Fett-Ind., 1926, **46,** 193-195). Mainly a discussion of the general reactions involved and the behaviour of the nickel-kieselguhr catalyst. Graphs are given for a number of oils showing the progress and completion of hardening, the fall in iodine value and corresponding rise in m.p., and also the fall in iodine value together with progressive fall in refractive index (Zeiss butyrorefractometer). For judging the progress of hardening in a particular case the determination at intervals of the refractive index of the oil is the quickest and is better than a method involving the measurement of the amount of hydrogen consumed. An accompanying table shows the amount of hydrogen in cub. m. at 0° and at 20° required to saturate completely 1000 kg. of the commoner fatty acids and fatty oils. In practice oils are seldom hardened till completely saturated. Owing to loss of hydrogen and to side reactions the amount of hydrogen consumed in a particular hardening is in practice 10-20 per cent in excess of the amount as calculated from the fall in the iodine value.

Vitamin A in "Oleo Oil" and Oleostearine. R. Hoagland and G. G. Snider (J. Agric. Res., 1926, **32,** 397-416). Oleo oil (expressed from premier just at about 90° F.) is usually graded as No. 1, No. 2, No. 3, and yellow oil, the last of which is prepared from fats derived from grass-fed cattle. The results are reported of a study of vitamin A content of 24 samples of oleo oil and 8 samples of oleostearine, collected from various commercial meal-packing plants. The vitamin A content of each sample was determined by feeding tests with young albino rats, the oil or stearine being the only known source of this vitamin in an otherwise adequate ration. In general, the yellow oleo oil was much the richest vitamin A; No. 2, No. 3 and mutton oleo oil had approximately the same value; and No. 1 oleo was the poorest in vitamin A. Similarly, each sample of yellow "stearine" was richer in this vitamin than any sample of the other grades of oleostearine. Although the yellow oleo was richer in vitamin A than the other lighter coloured grades, there appeared to be no constant relation between the colour of an oil and its vitamin content. Thus, the mutton oleo oil, dead white in colour, was richer in vitamin A than the light yellow No. 1 oleo oil, and approximately as rich in it as the medium-yellow No. 2 and No. 3 oils. "Oleo oil" ranks below butter, but ahead of lard and the vegetable fats and oils, as a source of vitamin A.—P. H. P.