will necessarily appear colored when viewed under another light source containing a different ratio of ultraviolet to visible light. It is therefore essential, in the search for the best detergents, to evaluate them first in the absence of any additives and to employ bleaches, blueing, or fluorescent dyes only to minimize their limitations.

The formulation of suitable soiling procedures and the application of reliable methods for measuring the washed cloth samples represent two important steps in the development of satisfactory laboratory tests for evaluating detergents. These steps are necessarily related to one another in a fundamental way. The procedures used in the past for detergency evaluation, involving the measurement of reflectance alone, have been appropriate with the soiling methods relying on carbon black as primary soiling agent but are not useful if realistic soiling techniques are employed and the degree of whiteness is to be determined.

While the colorimetric principles for an adequate objective rating of whiteness have been developed, the actual working methods should be based on a modern re-evaluation of the relative importance of the various colorimetric and psychological factors related to visual estimates of the whiteness of textiles. Such a re-evaluation, coupled with more appropriate soiling and measuring techniques, will lead to improved procedures for the laboratory evaluation of detergents.

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The Intra-Molecular Hypothesis of Stand Oil Formation

Letter to Editor:

POWERS (5) has criticised the conclusions drawn by Joubert and Sutton from their study (4) of the composition of a pilchard stand oil. It is not the writer's intention to become involved in a polemical discussion, but it is, on the contrary, worthwhile to consider the points raised to see how far they are met by the available data and to discuss what further work is needed.

The central issue involved is whether triglyceride oils are, on heating, first predominantly converted to intrapolymers[1] (i.e., molecules of the same weight but having a direct linkage between two fatty acid chains) or whether the first predominant reaction is linkage between two chains of different triglyceride molecules. Powers had deduced the former hypothesis whereas Joubert and Sutton's interpretation of their results supported the latter. The method employed was to separate from a stand oil that fraction having no increased molecular weight ("unpolymerized triglycerides") as compared with the original unbodied oil; the fraction was then saponified and separated by molecular distillation into monomeric and higher esters. The total polymers ("polymerized triglycerides") were also examined.

Powers states that molecular distillation (one-stage) is not a highly efficient separation method. We were however faced with the easy separation problem of separating only partially the monomeric esters from dimeric esters of about twice their molecular weight. In fact, we now know (2) that the same still separates methyl linoleate dehydro-dimer from methyl linoleate in a single passage so that considerably less than 2.5% of the former co-distills with the latter. In the pilchard stand oil work we did not require a perfect or near-perfect separation since the monomer : dimer ratios were simply calculated from the molecular weights of those fractions containing species higher than monomers. As is usual and necessary in this calculation, it was assumed that the other species present were dimers or trimers. The saponification equivalents were necessary because pilchard oil contains acids extending over a range of chain lengths. They were not by themselves used as an "index of the degree of polymerization." All assumptions made in the paper were clearly stated.

POWERS' statement that pilchard stand oil may be expected to be essentially different from linseed stand oil in respect of intrapolymer formation is hardly borne out by the data available (6), which have recently been reinforced by the work of Boelhouwer, Jol, and Waterman (1). Further work suggested is the examination of a range of oils bodied to different viscosities, but the labor involved would be very considerable.

The esters of the polymerized triglyceride fraction should contain, as Powers states, at least 33% of dimer acids, and this was stated in the paper. In fact, the figure observed was 33%, after making allowances for hold-up losses. As was pointed out, such losses in

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[1] It is assumed that references to "interpolymers" in Powers' letter are typographical errors and that "intrapolymers" should be substituted.

this case were higher than for the esters of the unpolymerized triglyceride fraction since the latter were of much lower viscosity. The figures for monomer : dimer ratios could be made more accurate by using larger quantities of material in the same-sized still.

The particular merits of the intra-molecular hypothesis have been that it attempts to explain time/viscosity and iodine value relationships during stand oil formation.

The characteristic shape of the time/viscosity curves obtained by bodying oil at constant temperature is however explicable if due consideration is given to the linear relationship reported (3, 7) to exist between the logarithm of the viscosity and the composition of stand oil mixtures. In this respect the fact that a pilchard stand oil of viscosity only 1.2 poises/29.5°C. contained no less than 35% of polymerized triglycerides is sufficiently striking. The difficulties attendant upon quantitative interpretation of iodine value decrease (even if these were accurate in themselves) in terms of polymer formation are formidable as has already been pointed out (4), and it still seems unlikely that the large ring formation necessitated by the intrapolymer hypothesis can predominate over intermolecular reaction.

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ABSTRACTS . . . . E. S. Lutton, Editor

• Oils and Fats

R. A. Reiners, Abstractor

Rotocel extraction of cottonseed produces high quality oil and meal. Anon. *Chem. Proc.* 16(2), 60(1953). A brief description is given of a Lubbock, Tex., plant in which coarsely ground prepressed cottonseed meal is solvent extracted to produce a residual meal containing less than 0.5% oil.

The lipides of sebum. Anon. *Nutrition Reviews* 11, 39-40 (1953). Recent work on the composition of sebum, the secretion of the sebaceous gland of the skin, is reviewed.

Chromatographic separation of fatty acids. T. Asahara, Y. Konishi, Y. Kuroda and M. Mashino (Tokyo Univ.). *J. Chem. Soc. Japan*, Ind. Chem. Sect. **54**, 70-2(1951). The separation of fatty acids has been carried out with calcined MgO, CaO, and Al_2O_3 as adsorption media. The combination of MgO and CaO gives better results than either alone. It is possible to separate the saturated fatty acids of 4-8 C atom difference, and the unsaturated acids of the same no. of C atoms but of different degrees of saturation. (*Chem. Abs.* **47**, 1407)

On the crystallization, structure and infrared spectra of saturated L-α-lecithins. E. Baer (Univ. Toronto). *J. Am. Chem. Soc.* **75**, 621-23(1953). A procedure is described by which it is possible to obtain L-α-(dimyristoyl)-, (dipalmitoyl)- and (distearoyl)-lecithins in a crystalline state. The elementary composition of the crystalline lecithins is in agreement with the formula:

$$RCOOCH_2{-}RCOOCH{-}CH_2OPO(O^-H^+)OCH_2{-}CH_2N^+(CH_3)_3OH^-.$$

The infrared spectra of the pure lecithins are reported.

Moringa acid oil (fatty acids from Ben oil) from East Africa. Miss H. Bennett, R. W. Pearman and W. D. Raymond. *Colonial Plant & Animal Products* 3, 55-57(1952). The sample of saponified Ben seed oil contained 80.8% free fatty acid (as oleic), and had an ester value of 30.7, iodine value 68.2, refractive index 1.449 and specific gravity (100°/18.8°) 0.8435. The fatty acids consisted roughly of 70% oleic, 4% linoleic acid and 22% saturated acids. The acid oil is useful in ore treatment as a collector for non-metallic materials.

The lipide composition during storage of human plasma, pooled, irradiated and dried. E. M. Boyd (Queen's Univ., Kingston, Ont.). *Can. J. Med. Sci.* 31, 84-93(1953). No loss of lipides in dried plasma occurred after storage at —40°, 4° or 20°; at 40° there was a 20% loss of lipides. Ultraviolet irradiation during processing did not affect the lipide composition of dried plasma determined before and after storage at 4°.

The dendê palm of Brazil. A. M. Cardoso. *Rev. brasil. quim.* (Sao Paulo) 33, 232-8(1952). The properties, chemical composition, and uses of the oil of the dendê palm (*Elaeis guineensis* or *E. melonococca* are discussed. (*Chem. Abs.* **47**, 890)

Chemistry of fats of fresh-water fish. III. Composition of fat in tissues of Perca schrenki. M. N. Chechenkin (State Pedagog. Inst., Pskov). *Zhur. Obschei Khim.* (J. Gen. Chem.) 22, 1244-53(1952). In fats from all parts of *P. schrenki* there were found unsaturated acids with 4-5 double bonds. The acid composition of fats from the body, head, entrails, and roe is very similar, but the fat from the liver has higher levels of very highly unsaturated acids. The most typical acid is terapinic acid, $C_{18}H_{28}O_2$, comprising up to 15% of the total of all tissue fats; arachidonic acid, $C_{20}H_{32}O_2$, ranges up to 5%. In the liver the typical acid is clupanodonic acid, $C_{22}H_{34}O_2$ (up to 15%), as it is in *P. fluviatilis.* Oleic acid is the prevalent constituent of all the body fats. *P. schrenki* does not appear to carry in its fat any detectable amounts of linoleic and linolenic acids. (*Chem. Abs.* **47**, 786)

Avocado-oil, properties and uses in cosmetics. Helmut Führer. *Seifen-Ole-Fette-Wachse* 79, 14(1953). Avocado oil resembles olive oil closely in its constants and on account of its sterol and vitamin content it possesses specific properties which make it particularly suitable for cosmetic purposes.

Determination of iodine number of fats in aqueous medium. A. I. Gengrinovich and E. A. Yudovich (Tashkent Pharm. Inst.). *Aptechnoe Delo* **1952**, No. 5, 17-22. The iodine nos. of a variety of fats were satisfactorily determined in 0.2 *N* HCl aqueous medium by means of ICl solution. The results are within 0.3 unit of the conventional method. (*Chem. Abs.* **47**, 887)

Autoxidation of fats. Formation of hydrogen peroxide. E. Glimm, E. Seeger and J. Boetcher. *Fette u. Seifen* **54**, 462-7 (1952). Kr light or sunlight, and presence of polyunsaturated acids accelerate, whereas darkness inhibits, autoxidation. At maximum peroxide value, the acid no. and saponification no. have risen and the iodine no. dropped to the value of the thiocyanogen no. When oxidation takes place in absolutely anhydrous fats, traces of water are split off which are necessary to the reaction. The keeping qualities of butter can be improved by heating to 80° for several hours to destroy the lipases, oxidases, etc., normally present. (*Chem. Abs.* **47**, 887)

Metals in oils: their determination by spectrographic methods and the errors involved. A. J. Ham, J. Noar and J. G. Reynolds (Thornton-le-Moors Chester, Engl.). *Analyst* **77**, 766-73