

glyceride acetates from a wide variety of different phosphatidyl lipids. Furthermore, several different methods are already available for the study of the diglyceride acetates. Besides the silver nitrate-silicic acid chromatography also the effective partition methods, for instance those of Kaufmann,³ should be easily adapted for their fractionation. The oxidation methods of Privett and Blank⁹ could be used for analysis of fatty acid localization in these molecules, and pancreatic lipase¹⁰ might also be usable. In short, it seems to me that a rather complete picture of the different molecular species of many phosphatidyl lipids might be obtained when all these procedures as well as GLC are successively applied to the study of the acetolysis products. It is a great advantage that all different phosphatidyl compounds can be studied through the same procedures of diglyceride acetate analysis.

Acknowledgements. I wish to thank Mrs. Satu Liusvaara and Miss Anneli Miettinen for skilled technical assistance. The samples of dipalmitoyl- and dioleoyl-phosphatidylethanolamine were gifts from Fluka AG, Switzerland, and from Dr. G. V. Marinetti, Rochester, USA. The support of grants from *Sigröd Jusélius Foundation* and from the *Finnish State Committee for Science* is gratefully acknowledged.

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Received December 13, 1963.

A Comparison of the Solid Behaviour of Stearic Acid, 17-Bromoheptadecanoic Acid and 17-Iodoheptadecanoic Acid

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Isomorphous replacement of a terminating methyl group in long-chain compounds by an ω -bromine atom has been investigated at this Institute,¹ and the present study concerns this as well as replacement by an ω -iodine atom.

The experimental technique used has been described earlier.¹ 17-Bromoheptadecanoic acid was synthesized according to Hunsdiecker and Hunsdiecker,² and its methyl ester was boiled with sodium iodide in acetone and hydrolysed to give 17-iodoheptadecanoic acid. The samples used were prepared by Miss G. Stållberg in 1948. Thermal and X-ray data on stearic acid given in the text have been taken from von Sydow³ and from Stenhagen and von Sydow.⁴

Data for the crystal forms observed and the phase behaviour are collected in Table 1. It is remarkable that at high temperatures the B-forms of the bromo- and iodo-acids are much more stable than that of stearic acid. A new crystal form of fatty acids called B₁ has been found for 11-bromoundecanoic acid.¹ It showed an X-ray diffraction pattern very similar to that of the B-form but the infrared absorption spectra of the two forms were clearly different. The B-forms of the acids studied here were identified on the basis of their infrared absorption¹ (according to the OH-out-of-plane band). It was accidentally found that the B-form of 17-iodoheptadecanoic acid may transform into the B₁-form. An infrared absorption spectrum was recorded seven years ago and the same pellet (pressed of the sample mixed with potassium bromide) was used for a new recording. The spectra showed that a transition from the B-form into the B₁-form had taken place during storage at +7°C. The rest of the sample stored at room temperature was still in the B-form. The lattice parameters of the B-forms of the three acids are given in Table 2, showing small

Table 1.

Substance	Crystal forms found	Phase transitions (°C)		
Stearic acid	A, B, C	54.0 A → C	46.0 B → C	69.7 C → liq
17-Bromoheptadecanoic acid	B, C		74.8 B → liq	73.0 C → liq
17-Iodoheptadecanoic acid	B, B ₁ , C		83.2 B → liq	82.7 C → liq

Table 2. Unit cell dimensions of the B-forms.

	<i>a</i> (Å)	<i>b</i> (Å)	<i>c</i> (Å)	β (°)	<i>d</i> (001) (Å)
Stearic acid	5.591 ± 0.011	7.404 ± 0.008	49.38 ± 0.10	117.37 ± 0.12	43.85 ± 0.05
17-Bromohepta- decanoic acid	5.67 ± 0.03	7.44 ± 0.04	49.2 ± 0.3	116.6 ± 0.6	44.0 ± 0.2
17-Iodohepta- decanoic acid	5.68 ± 0.03	7.38 ± 0.04	50.4 ± 0.4	119.0 ± 0.8	44.1 ± 0.2

but significant differences. A characteristic feature of the B-form of 17-bromoheptadecanoic acid is the twinning of the crystals. Many crystals were studied and all but one showed a false orthorhombic symmetry due to the twinning. The crystals were twinned on the bromine end-group planes with contact planes relating the individuals by mirror symmetry (neglecting translation within the contact plane).

Compounds with isomorphous crystal structures generally form solid solutions over the whole range of composition if the differing atoms of groups have similar size. The differences in shape between a bromine or iodine atom and a methyl group, however, might give special packing conditions in mixtures. Stearic acid and 17-bromoheptadecanoic acid were therefore mixed in different proportions and crystallized from the melt by successive lowering of the temperature in a thermostat from 85°C to room temperature over

a period of one week. X-Ray powder patterns of these samples showed that the two acids can replace each other in any proportion in the C-form lattice.

Thanks are due to Dr. S. Abrahamsson and Professor E. Stenhagen for their interest in this work, which has been financially supported by a grant from the U.S. Public Health Service (A-4006).

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Received December 20, 1963.