smaller rings and the oxygen atoms by larger ones. Open and filled circles represent atoms at $y = 0$ and $y = \frac{1}{2}$, respectively. The extension of the unit mesh is indicated by dotted lines. The titanium atoms are surrounded by six oxygen atoms to form TiO_6 octahedra which are joined by edges and corners. The coupling together of the octahedra is different from that found in anosovite (pseudobrookite structure) by Zhdanov and Rusakov [1]. Studies on the $(Ti_{1-x}, Fe_x)_3O_5$ system have shown the pseudobrookite-type structure to be present even at rather low contents of iron ($x < 0.05$)[2]. Further studies on the relationships between the Ti_3O_5 structure found in this investigation and the anosovite structure are in progress.

Full details on this investigation and a discussion of the structure will be given elsewhere.

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1. Zhdanov, G. S. and Rusakov, A. A. *Trudy Inst. Krist., Akad. Nauk S.S.S.R.* **9** (1954) 165.
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Correction to: Refractometric Determination of Diffusion Constants in the Critical Region of Partly Miscible Liquids *

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In Fig. 4, p. 895 the figures of the ordinate scale should be one fifth of those shown.

Consequently, the inclination of the resultant straight line of Fig. 4, which is stated at the end of the text to be 0.37 cm² per day and °C, should in fact be one fifth of this amount, *i. e.*, 0.074 cm² per day and °C.

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The Selenium Analogue of 6-Thioctic Acid

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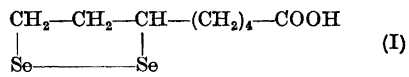
In connection with preparative and physico-chemical studies on organic disulphides and diselenides [1], particularly cyclic molecules [2], the author started a synthesis of the selenium analogue of 6-thioctic acid (α-lipoic acid) some months ago. The new acid (I), for which the name 6-selenoctic acid is proposed, has now been obtained in crystalline form, and investigations of its chemical and biochemical properties are in progress.

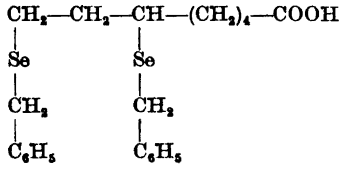


(I)

The primary aim of this investigation was twofold. First one could expect the 5-membered ring in 6-selenoctic acid to be more stable than the unsubstituted 1,2-diselena*cyclo*pentane, because it is known that substituents stabilize strained rings. Secondly, 6-selenoctic acid might possess interesting biological properties because of its similarity to 6-thioctic acid. When the present investigation was in progress, Schwarz and Foltz [3] reported the very remarkable discovery of a selenium-containing factor in casein and yeast. This factor ("factor 3") has been known for some years to be active against dietary necrotic liver degeneration and other diseases [3,4], but only recently Schwarz and Foltz showed that the biological action was connected with a low molecular weight organic selenium compound of unknown structure. Since pyruvic acid and lactic acid are accumulated in the blood of factor 3 deficient animals it seems possible to the present author that factor 3 is a cofactor in the oxidative decarboxylation of pyruvic acid. It is not impossible that 6-selenoctic acid might act as such a cofactor like 6-thioctic acid, and the hypothesis might be advanced that factor 3 is identical with or related to 6-selenoctic acid.

6-Selenoctic acid has been prepared in a way analogous to that used by Reed and

Ching-I Niu [5] in the preparation of 6-thioctic acid. Ethyl 6,8-dichlorooctanoate was allowed to react with the sodium salt of benzylselenol in absolute alcoholic solution, after which the ester was saponified and 6,8-dibenzylselenoloctanoic acid (II) isolated. This acid was treated with sodium



(II)

in liquid ammonia, and the product oxidized with air. From the reaction mixture 6-selenoctic acid was isolated. It consists of brownish-red crystals melting at 88—90.5°. The UV-absorption of 6-selenoctic acid has a maximum at 440 mμ. This is a good proof for the existence of the 5-membered ring and it shows that the substance is monomer [2]. The IR-absorption in the region 2—15 μ has been recorded and it is in accord with formula I. The molecular weight as determined by the Rast camphor method is 326 (calc. 300).

Experimental: 6,8-Dibenzylselenoloctanoic acid (II). 1.56 g of sodium is dissolved in 50 ml of abs. ethanol and 11.59 g of benzylselenol and 8.17 g of ethyl 6,8-dichlorooctanoate [5] is added. The mixture is stirred and refluxed in nitrogen atm. for 5 h. After cooling to room temperature 3.80 g of potassium hydroxide is added, and the mixture stirred at room temperature for 20 h. The reaction mixture is poured into 175 ml of water, acidified with 6 N HCl, and the product extracted with 2 × 50 ml ether. The combined etherial extracts are dried with sodium sulphate and the ether removed in vacuum. The crude acid solidifies at room temperature. It can be purified by dissolving it in a mixture of ether and petroleum ether and allowing the ether to evaporate slowly. In this way a fine crystalline almost white powder was obtained. Melting point 54—57°. (Equiv. wt: Found 477; calc. 482. % Se: Found 33.0; calc. 32.8).

6-Selenoctic acid (I): 0.35 g of sodium was dissolved in about 50 ml of liquid ammonia and 2.41 g (0.005 mole) of II in 10 ml toluene was added dropwise. A little more sodium was added to complete the reaction, and the ammonia was allowed to evaporate slowly. The residue was extracted with 70 ml of water, and the pH of this solution was adjusted to 7—8. A trace of $FeCl_3$ was added and a rapid stream of air passed through the solution. When excess hydrochloric acid was added a dark oil separated which was taken up in 50 ml of chloroform. The extract was dried with sodium sulphate, and when the solvent was removed in vacuum the crude 6-selenoctic acid solidified. The substance was purified by recrystallization from *n*-hexane, which gave a dark brownish-red crystalline powder m.p. 87—90°. (Equiv.wt: Found 298; calc. 300. Mol. wt: Found 326; calc. 300. % Se: Found 51.9; calc. 52.6).

A small sample was recrystallized again from *n*-hexane. The product consisted of brownish-red crystal flakes, m.p. 88—90.5°. The exact yield of the syntheses described above cannot be specified at present, but it exceeds 50 %.

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