configuration predominates in the metabolites of 11-oxygenated C_{19}-steroids such as adrenosterone. On the basis of these relationships, conclusions are drawn as to the probable precursors of some of the steroids which are commonly present in human urine. These conclusions are interesting and worthy of consideration but they should be regarded with some reservation. Variations among individuals are rather large and many studies have involved individuals who were suffering from disease.

A few errors were noted. In the names of the D-homo compounds in Table II, 17α-methyl appears instead of 17a-methyl. "*i*-Androstane-3α-ol-17-one" should be *i*-androstane-6α-ol-17-one. This substance is almost certainly an artifact and would be placed more appropriately with the other artifacts in Table II. Some carelessness was noted in the citation of references. The large amount of information presented in compact form and the key references should make this book very useful for those interested in steroid hormone metabolism or in the nature of the urinary steroids.

MAYO CLINIC AND MAYO FOUNDATION
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Titanium and Its Compounds. By GORDON SKINNER, HERRICK L. JOHNSTON and CHARLES BECKETT. Herrick L. Johnston Enterprises, 540 W. Poplar St., Columbus, Ohio. 1954. iv + 174 pp. 18 × 27.5 cm. Price, $3.50 for paper bound copy and $5.00 for hard bound cover.

As the preface of this book reveals, most of the information contained therein was compiled in 1949 in a literature survey carried out in the Ohio Cryogenic Laboratory, and has been revised so as to cover most of the pertinent literature through 1951. The coverage includes data on the preparation of titanium and certain of its compounds, including the hydrides, oxides, halides, nitride and carbide, and the alkaline earth titanates. A final chapter on thermal decomposition and reduction processes involving TiO_2 and TiO is followed by 25 pages of appendices, containing thermal functions of elementary titanium and of the oxides, halides, nitride and carbide of titanium and of calcium titanate. The heats of formation of some titanium compounds are listed and there is included an alphabetical index of 553 references to titanium literature.

The obvious intent of the authors is to present in a compact form the essential facts—largely numerical data—taken from the literature of titanium. This purpose appears to have been accomplished with relatively few typographical errors. There is no subject index, but in a volume of this size the detailed Table of Contents probably suffices for this purpose.

The book has been reproduced by offset lithography and makes a neat appearance. It should prove to be a useful adjunct to the previously available sources of information on this element, particularly Gmelin's "Titan" and Barksdale's "Titanium."

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Les Constantes Physique des Compose Organique Cristallises. By J. TIMMERMANS, Professeur honoraire de l'Université Libre de Bruxelles. Masson et Cie., Éditeurs, Librairies de l'Academie de Médecine, 120 Boulevard Saint-Germain, Paris VI, France. 1953. 557 pp. 16 × 24 cm. 5200 Francs (about $15.00).

Those who are interested in the problem of the transition between the solid and the liquid states, or the transition between two solid states of organic compounds, will find much of interest in Professor Timmermans' latest book. Although organic chemistry is notable for the number of possible molecular configurations, compounds may be classified in a simple system based upon the values of their physical constants.

Where the length of the molecule considerably exceeds the transverse dimensions (fiber molecules) one has chain-like molecules of which there are several homologous series. All these series obey the principle of convergence of properties for an infinitely long chain. For example, the melting points of the longer members of these various homologous series converge at about 117°. This is verified by many other constants, such as molecular volume, heat of combustion, etc., which are properties of the molecule and not of the system. These molecules behave like rigid rods in the crystal, and show an alternating phenomenon (even-odd) for many of their properties (temperature, heat and volume of fusion, etc.) resulting from their symmetry about the main axis of rotation.

A second category of typical substances is the sheet-like molecule, where one of the molecular dimensions is much smaller than the others. Aromatic molecules are well represented in this group and their behavior is considerably influenced by the symmetry of the molecule. If the linkages between molecules in the crystal extend to the point where they reach the limits of the crystal, as in the case of Carborundum, one obtains a substance which exists as a distinct molecular species. There then results either a body in the form of a thin sheet, which can serve as a lubricant such as graphite (2 dimensions), or the very durable substances (Carborundum), or a body which decomposes at high temperatures in place of melting such as the proteins.

If the molecule is of such a nature that its symmetry permits rotation about itself, or if it is a sphere, one is concerned with the remarkable *spherical* category of matter. Characterized in the first place by their particularly small entropy of fusion, they present a number of curiosities. These spherical molecules have an elevated melting point with a strong saturated vapor pressure at the triple point. Many of these substances tend to sublime at atmospheric pressure rather than melt. Their great symmetry transforms them by crystallization into the cubic system. This has a tendency to form mixed crystals between substances whose formulas are clear cut and are at the same time antipodes of the same substance. Some of these materials exist as enantiotropes having a solid state transition whose heat of transition is considerably higher than the heat of fusion. The elevation of the fusion temperature with increase of pressure is more marked with these materials. Such spherical compounds possess a dielectric constant, a specific heat, a plasticity, etc., which strongly approaches that of the liquid state.

Thus, spherical molecules form a mesomorphic state apart from normal and anisotropic liquids. In the spherical molecules, the transition from the anisotropic to the isotropic forms takes place in the solid state. For normal liquids, it takes place at the melting point, while for anisotropic liquids it takes place in the liquid state at the "clearing temperature."

In addition to the text, the author presents numerous excellent tables among which are:

(a) Melting and transition point data on 56 molecules melting mainly below room temperature.

(b) Specific heat equations for 59 organic molecules melting at 25° or below.

(c) Specific heat sources for about 250 organic molecules.

(d) Melting points for over 2,000 organic compounds melting below 0°.

(e) All the homologous series where the freezing point for the members can be established. These curves support the author's "Law of Convergence."

(f) Melting and transition points together with the associated heat changes for about 1,000 organic molecules.

In addition, there is an extensive bibliography and a good index to the compounds treated in the book. This book should appeal to industrial and academic workers who are interested in the melting process and the behavior of molecules which undergo solid state transitions.

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