

Winkel $cr = (001):(101)$, ferner $am = (100):(110)$ und $bq = (010):(011)$ benutzt, wobei bq , das aus den beiden anderen berechnet werden kann, zur Kontrolle mit angegeben ist.

Der erste Band enthält zwei Teile. Im ersten Teil sind zwei ausführliche Einführungen in das Messen und Berechnen der Kristalle sowie in das Barker'sche System gegeben, eine elementare für Nicht-Kristallographen von dem Chemiker L. W. Codd auf 60 Seiten, die andere speziellere von M. H. Hey auf 53 Seiten. Beide Anweisungen sind übersichtlich und klar geschrieben, sie benutzen sowohl die stereographische wie die gnomonische Projektion und bringen eine Reihe von Beispielen. Eine Tabelle der Vielfachen der Tangenten von $5^\circ - 82^\circ 57'$ ist abgeschlossen. Dann folgen, mit farbigen Vorsatzpapieren gekennzeichnet, die Klassifikationswinkel der tetragonalen, hexagonalen und rhombischen Kristalle. Die nächste Tabelle enthält die Brechungsindizes der wirteligen Klassen, geordnet nach ansteigenden Werten nach ω und der rhombischen nach β . Es sind hier wie bei den folgenden Tabellen der Dichten und der Schmelzpunkte nur die Indexnummern des zweiten Teiles angegeben. Den Abschluss dieses ersten Teiles bilden je eine Liste der englischen chemischen und mineralogischen Namen sowie der deutschen nach Groth ebenfalls mit Angabe der Indexnummern.

Der zweite Teil bringt dann die systematische Datensammlung, die im wesentlichen auf der *Chemischen Kristallographie* von Groth beruht. Einige Daten stammen aus anderen Quellen, besonders aus den *Crystallochemical Tables* von Donnay & Melon. An der Zusammenstellung, die die Daten für 2991 Krystalle enthält, haben zahlreiche Forscher vor allem in Oxford, wo das *Barker Index Committee* seinen Sitz hat, und in Groningen unter Terpstra mitgearbeitet. Jeder Winkelwert wurde von zwei Bearbeitern unabhängig berechnet und von einem der beiden Herausgeber kontrolliert. Die Kristalle sind in den einzelnen Systemen, die wieder durch farbige Vorsatzblätter gekennzeichnet sind, nach den Winkeln cr angeordnet. Für jedes Kristallsystem sind die Ordnungsprinzipien auf dem Vorsatzblatt noch besonders angegeben. Bei jedem Kristall ist zunächst der englische Name und die chemische Formel angegeben, sowie Name und Zitat bei Groth und ein zweites Zitat aus einem anderen Standardwerk. Es folgt die für jedes einzelne System durchlaufende Indexnummer und die Winkel cr (unterstrichen), im rhombischen System auch am und bq und eine Liste der Formen zur Aufstellung nach Barker. Ferner werden die Achsenverhältnisse angegeben, die Symmetrie in Hermann-Mauguin'schen und Groth'schen Symbolen, die auftretenden Formen, Habitus, Transformationsformeln, die optischen Eigenschaften, spezifisches Gewicht und die d -Werte für die wichtigsten Linien im Pulverdiagramm. Nur Vorwort und Erläuterungen sind im gewöhnlichen Druck, sie enthalten 74 Figuren, die Tabellen sind nach Schreibmaschinenvorlage reproduziert, ein Verfahren, das den Vorzug hat, Druckfehler zu vermeiden und wohl auch billiger zu sein. Die Übersichtlichkeit und Lesbarkeit sind dabei ausgezeichnet.

Das Buch zeigt, wie die goniometrische Vermessung neben den anderen Methoden ohne grossen Aufwand an Arbeit verwendet werden kann. Wieweit sich nun dieses Verfahren als Bestimmungsmethode durchsetzt, wird die Erfahrung lehren müssen. Es wird vor allem bei organischen Kristallen sehr nützlich sein können. Wie Mary W.

Porter, einer der beiden Herausgeber, mitteilt (*Endeavour* (1951), 10, 40), konnten von 16 z. T. sehr kompliziert zusammengesetzten Substanzen 15 auf Grund der Tabellen identifiziert werden, bei der 16ten war die Flächenausbildung zu schlecht.

Das umfangreiche Werk enthält aber nicht nur die Barker'schen Winkel, sondern stellt eine vollständige Datensammlung der tetragonalen, hexagonalen, trigonalen und rhombischen Kristalle dar, die durch die Namenslisten auch bequem als Nachschlagewerk benutzt werden und auch so zu einer engeren Zusammenarbeit zwischen organischer Chemie und Kristallographie anregen kann.

Die beiden Herausgeber darf man beglückwünschen, dass sie dieses Standardwerk in dieser mustergültigen Form herausgebracht haben und hoffen, dass die beiden fehlenden Teile bald nachfolgen.

C. W. CORRENS

*Sedimentpetrographisches Institut
der Universität,
Göttingen, Deutschland*

Fourier Transforms. By IAN N. SNEDDON. Pp. 12+542. New York: McGraw-Hill. 1951. Price \$10.00.

There is perhaps no subject in physics for which the theory of Fourier series and integrals, i.e. the theory of Fourier transforms, is at present more vital than for X-ray crystallography. A book on Fourier transforms and their application to physical problems is therefore of immediate interest to the crystallographer. The author, well known as the co-author (with Mott) of a very useful introduction to wave mechanics, has given a clear and fairly comprehensive account of the mathematical formalism of Fourier transformation, including closely related transformations such as Hankel transforms and Laplace transforms. It is the account of a physicist who is willing to achieve precision and easy understanding in his mathematics by restrictive conditions rather than by highly sophisticated ones. Thus the first 90 pages contain the mathematical theorems and examples, and the remaining 420 pages are devoted to applications to physical problems, namely, vibrations, heat conduction, hydrodynamics, elasticity, atomic and nuclear physics, and the diffusion of neutrons in matter. Three chapters on Bessel functions, on the method of steepest descent, and a tabulation of integral transforms are appended and form the last 22 pages.

Should the crystallographer deplore that none of his work is even mentioned in this book? He, in particular, might prefer to see the space devoted to other applications, but in the interest of non-crystallographers it is rather disappointing that all the many problems connected with termination of series, accuracy of position of maxima, phase determination, shape factors, transforms of statistical structures etc. are entirely omitted. It is true that some of these problems could be regarded as concerning Fourier series rather than integrals—but where is, in practice, the frontier between discontinuous and continuous Fourier transforms? It is all one theory.

An equally grave omission, and one which will be felt by crystallographers as well as physicists, is the application of Fourier transformation to statistics. A chapter on the concepts of modern statistics in the light

of Fourier transformation could have been most illuminating. In spite of this criticism of its scope, the book is, however, a very welcome addition, and the crystallographer who is engaged on theoretical problems will do well to get acquainted with it.

P. P. EWALD

Polytechnic Institute of Brooklyn
Brooklyn 2, N.Y., U.S.A.

Gmelin's Handbuch der anorganischen Chemie. Titan. Pp. xxii+41 with 100 figs. Weinheim/Bergstrasse: Verlag Chemie. 8th ed. 1951. Price DM. 113.

The present volume on titanium is the first complete section (System No. 41) to appear as part of the Gmelin Handbook after the interruption of this fundamental work through the war. A preface tells of the difficulties encountered in re-establishing the damaged and dispersed archives, and of the help received from many scientific and industrial quarters as well as from the Science Officers of the German Control Commission, Drs Roger Adams and B. N. Blount.

The objective of this book is to offer a full account of titanium the element, its alloys, and its inorganic compounds, and also of the reactive properties of its ions. This is done in uniform style with great clarity and in a very convenient form. Among the physical data listed and discussed are thermodynamical data (melting, boiling and transformation temperatures, specific heats, entropy, conductivity, expansion) and optical data (refraction, dispersion, absorption, infra-red, electro- and magneto-optical effects, luminescence, band-spectra, X-ray absorption structure).

The physical properties, including the crystal structure, are fully covered as far as known. In the case of titanium oxides, for example, they fill 34 pages, for TiN 5 pages, for BaTiO₃ 18 pages. Chemical properties, stability and modes of preparation are of course fully reported.

The crystallographer will find that Gmelin comes nearest to a revised edition of Groth's *Chemische Kristallographie*, the need of which has often been felt and discussed. It contains much more information than Groth ever intended to collect, but with the ever increasing integration of crystallography, chemistry and physics this is probably all to the better.

This volume, as the subsequent ones which are to complete Gmelin's Handbook within the next 10 years, includes the literature up to 1 January 1950. This uniformly applied termination will make it possible to issue supplementary parts in order to keep the work up to date.

In spite of many subsidies, the Gmelin volumes are very expensive. This is, unfortunately, unavoidable in a work compiled by a large staff of highly qualified scientists. The Handbook should be considered as an instrument for research, and its price compared with that of a spectrometer or other indispensable high-precision equipment. Judging by the references, each page is based, on the average, on 15-20 original papers which had to be read and condensed. To find out that nothing is to be found in the literature, including the patent literature, about a certain property of a substance is usually even harder than finding observed data, and yet

it is often essential in planning research. Gmelin's Handbook offers the closest approach to giving an answer to this question because, by all tests the reviewer could think of, it came out as giving a complete coverage.

In the case of high-precision measurements we are accustomed to pay more money for finding a reliable figure of the last decimal than for all the previous ones taken together, and we know that this expenditure often gives an important return. In a collection and digest such as Gmelin the corresponding achievement is completeness, and it is inevitable to have to pay for the reasonable certainty that nothing significant can be found in the literature beyond what has been reported. The savings in time and effort achieved by using a reliably complete work of reference should be remembered in balancing the expenditure for Gmelin.

P. P. EWALD

Polytechnic Institute of Brooklyn
Brooklyn 2, N.Y., U.S.A.

Crystal Growth. By H. E. BUCKLEY. Pp. xv+571, with 257 figs. New York: Wiley; London: Chapman and Hall. 1951. Price \$9.00; 72s.

This book is a welcome survey of the theories and observed facts of crystal growth. Particular attention is paid to the growth of macroscopic single crystals from aqueous solution, and a detailed account, perhaps overlong, is given of the special field of habit modification by adsorption of dyes and other co-solutes. Written at an elementary level, it is a useful supplement to the more specialized account of various aspects of the field given in the recent Faraday Symposium. The book should prove of value to the lay worker in many fields outside that of formal crystallography.

Following a chapter on solubility and supersolubility, a lengthy and useful description is given of practical methods for growing large single crystals from solution or melts. The surface energy, diffusion and structural approaches to the problem of growth mechanism and the growth velocities of crystal faces are discussed in four following chapters. Solution phenomena, the ideal-real crystal problem and habit modification are then dealt with as major topics. Three additional chapters are largely a composite of smaller topics, including the pressure of growing crystals, vicinal faces, dendrites and spherulites, oriented growths and inclusions in crystals. The subject of the formation and distortion of growth twins is not entered, although the matter is relevant and its literature extensive.

The work is occasionally marred by inexpertness variously in the statement of fact, organization of material, or point of view. This could be the lot of any author venturing to write a comprehensive treatise in a field as broad and intricately partitioned into specialities as the present one. The documentation of the text is adequate but on the whole not critical, and apparently a number of important contributions, especially in recent literature, have not been used. The chapter on peculiarities of crystal growth does not discuss the work of Morse and Donnay on spherulites, and Bernauer's monograph on twisted crystals is not cited. Reference is not made to Seifert's exhaustive monograph on anomalous mixed crystals, or to the books on crystal growth by Tertsch