

BOOK REVIEWS

BOUŠEK V., KAŠPAR P.: *Speciální optické metody*. Academia. Praha 1983, 190 pp, 22 tables, 97 figures, 8 plates.

The book contains eleven chapters: preface, the theory of transmitted light, dispersion of indices of refraction and birefringence, measurement of refractive indices, interference methods, measurement of optic axial angle, universal stage methods, graphical determination of optical quantities by means of nomographs, microscopic observation in different spectral ranges, a list of abbreviations used in the book, references, index.

The chapter on the "Universal Stage Methods" was written by F. Fediuk, author of many books and papers dealing with this particular method and other methods used in optical crystallography.

The preface gives the reasons for the advancement of research methods based on the optical properties of minerals in transmitted light. It also presents the contribution of Czechoslovakian mineralogists and petrographers to the development of these methods.

In the chapter dealing with the theory of transmitted light, the authors explain the phenomenon of light polarization, the nature of optical properties of minerals, refractive indices, optical properties of isotropic, uni- and biaxial minerals.

Most valuable is the chapter discussing the dispersion of refractive indices and birefringence. It is richly illustrated by graphs, tables and figures. Very informative is Figure 3 which shows the relationship between the refractive index and the light wavelength, taking fluorite crystals as an example. One of the tables presents light wavelengths for individual colours. The behaviour of white light on passing through a prism is also illustrated. Furthermore, the chapter describes light dispersion in isotropic and anisotropic media, and discusses the sources of monochromatic light.

The most comprehensive chapter in the book is the one on the "Measurement of Refractive Indices". It discusses in detail the methods of measurement of refractive indices, i.e.: refractometry, involving measurements on the refractometer hemisphere (Abbe-Klein); total reflection method, involving measurements with Abbe's universal prismatic refractometer, as well as with Pulfrich's or Wright's refractometer; prismatic method, involving measurements of the angle of minimum deviation, and measurements in the vertical system, in liquids and in low-melting solids; Obreimov's method, mainly employed for measuring refractive indices in glass; the method of Souza-Brandão, used for measurements in liquids; immersion method, involving measurements in immersion liquids; method of low-melting solids (e.g. selenium with sulphur and other compounds, mixture of isotropic thallium salt crystals

etc.); comparison of refractive indices by means of Becke line or by oblique illumination (the method of Schröder van der Kolk); partial darkening method; dark field method; phase contrast method.

The chapter also compares the measuring accuracy of refractive indices obtained by different methods, and presents the attendant improvements in the design of measuring instruments. Moreover, it discusses the calculation of refractive indices on the basis of reflectance measurements.

In the chapter on the "Interference Methods" the authors discuss the phenomenon of birefringence, the method of determining the thickness of thin sections, and the principles of microscopic interference. They give a description of Pluta's and Beyer-Schöppe's "Interphako" interferometer microscopes and of Berek's compensator, along with the methods of its adjustment, the determination of compensator constants, the determination of the optical character of a mineral, the determination and calculation of birefringence. Other applications of Berek's, Babinet's and Ehringhaus' compensators are also discussed.

The chapter on the "Measurements of Optic Axial Angle" presents conoscopic images of biaxial minerals and discusses measurements of optic axial angle in a polarizing microscope, with a conometer, and on a rotary axis stage. It also describes the method of calculating optic axial angle from refractive indices and the methods of observation of axial images by means of glued spheres.

A chapter deserving note is the one dealing with "Fedorov's Method of Universal Stage", which describes the design and uses of the stage. The graph included in this chapter facilitates the calculation of corrections for refractive index, as well as the determination of the orientation of indicatrix of uni- and biaxial crystals, the determination of the position of crystallographic planes, etc.

The chapter on the "Graphical Determination of Optical Quantities by Means of Nomographs" gives some examples of such determinations in titanite, disthene and other minerals.

The last chapter, dealing with the "Microscopic Observation in Different Spectral Ranges", characterizes infrared, ultraviolet and X-ray microscopy.

The presented list of abbreviations used in the book is lucid. The list of references, comprising 174 items, represents publications from nearly all the countries in the world.

In conclusion, it can be stated that the book in question has very rich subject-matter. It discusses the latest achievements in the field of optical crystallography and all the research methods employing microscopy in transmitted light. It is a valuable didactic book, and although intended primarily for mineralogists and petrographers, it will also prove useful for physicists, chemists and geologists.

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