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The elastic constants of zincblende, determined from thermal diffuse scattering of X-rays.

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Following the method of Ramachandran & Wooster (1949), the elastic ratios, c_{12}/c_{11} and c_{44}/c_{11}, of zincblende have been determined by measurement of the diffuse scattering of X-rays. The specimen used was a piece of lemon-yellow Santander blende; all measurements were made on a well-developed, natural, rhombic dodecahedral face, at room temperature, with a Geiger-counter spectrometer (Wooster, Ramachandran & Lang, 1948) using Cu $K\alpha$ radiation. Measurements of diffuse scattering around the reciprocal-lattice point 220 in the axial directions [110], [100], [001] and [111] give the elastic ratios $c_{12}/c_{11} = 0{\cdot}65$, $c_{44}/c_{11} = 0{\cdot}34$. The compressibility of zincblende has been determined twice, by Madelung & Fuchs (1921), and by Bridgman (1925), and their values for the compressibility $3/(c_{11}+2c_{12})$, combined with these elastic ratios, give the elastic constants as follows:

$$c_{11} = 10{\cdot}0 \times 10^{11}, \quad c_{12} = 6{\cdot}5 \times 10^{11},$$
$$c_{44} = 3{\cdot}4 \times 10^{11} \text{ dynes cm.}^{-2}.$$

The accuracy of the elastic ratios is about 5 %.

It is interesting to note that the elastic ratios are in agreement, within the experimental error, with those calculated from the constants published by Bhagavantam & Suryanarayana (1944), namely

$$c_{12}/c_{11} = 0{\cdot}67, \quad c_{44}/c_{11} = 0{\cdot}38 \quad (c_{11} = 10{\cdot}79 \times 10^{11},$$
$$c_{12} = 7{\cdot}22 \times 10^{11}, \quad c_{44} = 4{\cdot}12 \times 10^{11} \text{ dynes cm.}^{-2}),$$

but these absolute values for the elastic constants are not in good agreement with the previously published compressibility data.

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Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. Copy should be sent direct to the British Co-editor (R. C. Evans, Crystallographic Laboratory, Cavendish Laboratory, Cambridge, England).

The Barker Index of Crystals

It is common knowledge that, except in the cubic system, the angles between the faces of the crystals of any substance capable of existing as a crystal are specific. These characteristic interfacial angles can therefore be used for the identification of crystalline material, provided that some guiding principle can be established to enable a choice to be made from the multiplicity of angles present in many crystals. With such a principle established, crystals as small as a cubic millimetre can be measured and identified without loss or destruction of material. The identification could be established if all known crystal measurements were tabulated in the numerical order of their measured angles, and the principles of choice agreed upon.

Fedorov, the great Russian crystallographer, devised a method of classification based on his theory of crystal structure. This he used to compile a great index of crystals published in 1920 as *Das Krystallreich*. It contained a list of all crystals measured up to that date, and any substance in the index could be identified. The methods used, however, were complicated and involved laborious calculations.

The late Dr T. V. Barker of Oxford, who had been a pupil of Fedorov and a collaborator in *Das Krystallreich*, after much work devised a system of more practical use than that of Fedorov. The methods of Barker were based on the geometrical properties of the crystal, more especially the crystal angles, while those of Fedorov were based on a theory of crystal structure. In 1930 Barker produced a book, *Systematic Crystallography*, in which he first described a set of rules based on the 'principle of simplest indices'. He proposed to make these rules the foundation for a workable index of crystals. In this index, under each crystal system, a certain angle was to be given in order of increasing magnitude. The rules ensured that no ambiguity could arise in the choice of the classification angles. Unfortunately, Dr Barker died in April 1931. A number of crystallographers met in Oxford after his death, and after some trials of his methods decided to prepare an *Index* based on Barker's rules. The headquarters of the work was the Department of Mineralogy at Oxford. It was decided to follow Barker's plan of first dealing with the 7000–8000 substances described in Groth's *Chemische Krystallographie*, in which work of five large volumes they are arranged according to their chemical composition.

Several crystallographers undertook the task of studying the crystal measurements already known and of calculating the appropriate classification angles for the Barker *Index*. Early in the work it was necessary to make minor modifications in his rules; delays also occurred due to misprints and to inaccurate measurements and errors of calculation in the original descriptions. In the *Index* as it stands to-day every calculation has been made independently by two workers and checked by one of the Editors (M. W. Porter and R. C. Spiller). The first volume of the Barker *Index* will contain crystal descriptions of approximately 3000 compounds of the tetragonal, hexagonal, trigonal and orthorhombic systems. The