factors, and where the low-order reflections make a relatively large contribution towards the least-squares matrix elements, this could be because the data set was limited or because an inappropriate weighting scheme was employed. The effect should be decreased if an extinction parameter is refined as this can also soak up errors for low-order reflections.

Refinements were carried out for five structures, with models where a N atom was given occupation factors 0·86, 1·0 and 1·14. 0·86 corresponds to replacing N by C, and 1·14 to replacing N by O. The occupation factor for a C atom was adjusted so that the total scattering power of the molecule was constant. The effect was observed for all the structures although in some cases only for limited data sets (Table 1). The effect increases as $(\sin\theta/\lambda)_{max}$ decreases.

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International Union of Crystallography

Acta Cryst. (1984). A**40**, 309

Union Office Computer

With the help of a generous donation from the Japanese crystallographic community, a minicomputer with 384K bytes of memory and 15M bytes of hard disc storage (with magnetic cartridge tape back-up) has been installed in the Union office at Chester. Six VDU terminals and two printers, together with the software supplied, allow timely accounting for all the Union's financial transactions. A balance sheet and accounts, comparable to those published in the annual Executive Committee reports [*cf. Acta Cryst.* (1984). A**40**, 68–85], can now be produced at short notice. In addition, the progress of all papers throughout the journal production process will be monitored, duplications identified, status reports listed and subject index, chemical name index, author index and formula indexes maintained. Production of the next cumulative index will save approximately the total cost of the microcomputer.

An engraved wall plaque commemorating the Japanese gift has been placed in the Chester office.

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (J. H. Robertson, School of Chemistry, University of Leeds, Leeds LS2 9JT, England). As far as practicable books will be reviewed in a country different from that of publication.

Acta Cryst. (1984). A**40**, 309–310

Points, lines and walls in liquid crystals, magnetic systems and various ordered media. By M. KLÉMAN. Pp. 322. Chichester–New York–Brisbane–Toronto–Singapore: John Wiley & Sons, 1983. £29.95.

The technical importance of liquid crystals has challenged many papers, especially in the theoretical interpretation of their outstanding properties which are essentially determined by defects. Approximately 30 years ago a similar development took place in the theory of plastic deformation of metals. It could be shown then that edge and screw dislocations as defined by the direction of a line and their Burgers vector, given by the well known Burgers circuit, suffice to explain the dynamic behaviour of crystals during plastic deformation. Since structural details of the kernel of dislocation lines were irrelevant, the extension of this theory to materials other than metals was very simple. Now, a more generalized treatment of similar defects is offered in Kléman's book, which explains the topology of defects in media which are in general characterized by a tensor field, *e.g.* a director field in the case of first-order tensors.

The author starts by showing many pictures of defects predominantly taken with the optical microscope using crossed nicols. It is regrettable that no direct correlation between these pictures and the defects described in the text book is given; this could have been done at least in some cases. Then a classification of defects is given, beginning with the symmetry of nematic, smectic and cholesteric phases. The formal topological description of most of the defects is explained in terms of the so called 'Volterra process', which is a valuable means whereby an adequate description of many types of dislocation, disclination *etc.* is possible. In the following chapters a systematic review of the most important defects in liquid crystals is given. Obviously these defects also play an important role in the magnetic properties of crystals where spin orientation and spin density are the relevant factors describing their properties (*e.g.* Bloch walls, Néel walls, helimagnets *etc.*). In the last chapter Kléman gives a review of a generalized group-theoretical classification of topologically stable defects. This method yields a unique treatment of singularities including lines and walls, which are partially described in a more or less artificial manner by the Volterra process. Obviously a better understanding of the relevant basic mathematics is necessary in this part of the book. The treatment of the dynamics of liquid crystals, which is an important field of present and future development in this field lies beyond the scope of this textbook.

Apparently the author has endeavoured to keep the mathematical background necessary for full understanding of a complicated subject as low as possible. Consequently, advanced students as well as scientists may use it as a good

source of information, if they already have some knowledge, especially in the field of liquid crystals. Citation of literature seems to be fairly complete, and opens the field for further studies.

The subject index contains about 160 key words, a small number when compared with the numerous new definitions and items presented in the book. Some of the key words, such as earthquake, catastrophic theory, turbulence and others which are not explained in the text could have been dropped, others which are extensively treated are not included. Since the index contains relatively more mistakes and errors than could be detected in the various chapters this reviewer recommends a revision of the index for the next edition. This seems to be the only criticism that could be raised of this useful book.

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Point defects and defect interactions in metals. Edited by JIN-ICHI TAKAMURA, MASAO DOYAMA and MICHIO KIRITANI. Pp. 990. University of Tokyo Press and North-Holland Publishing Company, 1982. Price US $106.50, Dfl 250.00.

This book is a report of the Yamada Conference V on Point defects and defect interactions in metals held in Kyoto, Japan, in November 1981. Thus it is the latest in a series of independently published reports of international conferences on the present or closely related topics. The earlier conferences were held at Kyoto, Argonne and Jülich in 1962–64–68 and at Gaithersburg, Gatlinburg and Argonne in 1973–75–76.

In all the volume contains some 200 contributed papers. They are mainly short typical conference report papers of 3–4 pages, with a group of larger (8 page) keynote papers presumably submitted by invitation. These latter papers, although not reviews in the full sense, provide the reader with a brief statement of our current state of knowledge in various topics. The papers in the book are divided into eight major categories: *Advances in techniques*–11 papers; *Atomic defects*–55; *Point defect solute interactions*–44; *Diffusion*–16; *High-concentration alloys*–14; *Defect clusters*–16; *Interaction with dislocations and grain boundaries*–9; and *Radiation damage*–37. Further division into sub-categories is made for the three major categories above. For example, the *Radiation damage* category is divided into *Primary damage*, *Radiation-induced microstructure* and *Solution stability and segregation*. There is also a ninth category, *Future problems and comments*, to which three of the prominent participants have contributed very brief assessments of the conference achievements and attempt to point the way ahead.

The contributed papers cover a very wide range of experimental techniques for the detection and analysis of point defects and their interactions. Of these techniques, some will already be familiar to most scientists with an interest in the solid state. These include resistivity studies, thermal expansion measurements, X-ray Bragg and diffuse scattering, transmission electron microscopy and Mössbauer spectroscopy. Other techniques reported which are probably less widely familiar include ion-channelling, nuclear magnetic resonance, ultrasonic attenuation, positron annihilation (lifetime, line shape and angular correlation) and muon spin resonance techniques. Clear exposition of the applications of these techniques to defect studies are found in some of the larger papers. Other papers are devoted to purely theoretical studies. For example, in the category of *Atomic defects*, there are papers concerned with: the calculation using self-consistent pseudo-potential theory of the electronic structure and formation energy of a vacancy in aluminium; the electronic structure of impurities in the transition metals; the lattice vibrations around point defects; and several other topics.

A good feature of the book is the extensive report of the discussion evoked by the various papers. The discussions, which total some 112 pages, are presented as a series of questions and answers for individual papers and are grouped together at the end of each sub-category. The requirement of submitting questions and answers in writing has in most cases resulted in a greater understanding (though not necessarily agreement) between the contributor and questioner than is often the case during oral discussions. Occasionally, however, the *reader* is still left in some doubt through the misprinting of words in either question or answer, *e.g.* on p. 139 in discussion of paper on p. 113 we have 'Our calculated results show the small *electric* binding energy between a vacancy and an In impurity in Zn and the small negative binding energy in Cd' . . . electric = positive . . .?

As with all large conference volumes there is a significant variation in the standard of the contributed papers, both in scientific content and in the clarity of their presentation. It is also a very large book, 990 pages, but it has been given both an author index and a very good and detailed subject index. The final result is that the book with its approximately 200 papers and their attendant discussion comprises a worthwhile conference report but does not reach the editors' aim (flyleaf notes) of being 'a general text presenting the current state of the existing fundamental knowledge of point defects and their interactions in metals'.

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Radiation effects computer experiments. By J. R. BEELER JR. Vol. 13 of **Defects in solids.** Edited by S. AMELINCKX, R. GEVERS and J. NIHOUL. Pp. xviii + 881. Amsterdam: North-Holland, 1983. Price US $168.00, Dfl 395.00.

The study of radiation effects in solids involves the interactions of energetic primary radiation particles with one or,