Catalysis are all very good and Dearnaley's contribution on ion implantation and that by Makin on static electrification have much to offer newcomers to these topics.

Crystallographers will be particularly interested in the articles by Andersson and Somorjai who discuss some of the recent LEED analyses of clean surface structures and of adlayer arrangements. Lundquist's *Electrons at Metal Surfaces* is an admirable survey of general interest whereas that on surface spectroscopy (Chiarotti) simply illustrates, by omission, how rapidly photoemission studies have matured. Other topics on surface structures include thermodynamics (Garcia – Molier), a conventional discussion of LEED (Fingerland and Tomasek), nucleation theory (Forty), Brillouin–Wigner theory (Jones) and liquid surfaces (Berry). Properties of surfaces are reflected in discussions by Celli on excitations and Many on transport in the space-charge region.

Overall, the chemist and biologist are not well catered for, hence my complaint about trying to tackle surface science in this way. Not many biologists would think that Schnakenberg's discussion of biological surfaces (biological membranes) is reflective of the immense activity in the field. I was a little more relaxed by the three articles on *Atoms and Molecules of Surfaces* although Brenig's (hydrogen chemisorption) and Gomer's (a brief survey) suffer by comparison with a very nice article by Nahr on atomic scattering.

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Crystal structure and chemical bonding in inorganic chemistry. Edited by C. J. ROOYMANS and A. RABENAN. Pp. x+246. Amsterdam: North Holland, 1975. Price: Dfl 45.00 (US $18.75).

This book contains papers given at a symposium in honour of the 80th birthday of Professor Dr A. E. van Arkel. The contributions contain examples of aspects of the chemical bonding, the crystal structure and the properties of inorganic compounds. The papers mostly give a survey of what has happened within the field up to now.

The historical development of the electrical aspect in chemical bonding is reviewed by Professor Klemm. His article gives a good account of the situation in inorganic chemistry during the nineteen thirties and forties.

P. F. Bongers relates magnetic properties to the chemical bond. The application is concentrated on a few compounds like pyrites, spinels and vanadium oxides. A discussion of *Alkali metal suboxides* by Arndt Simon is limited to the Cs and Rb oxides. The crystal structure and the method of growing crystals have been described in a very detailed way. Interesting examples of intermediates between salt-like and metallic types of bonding are discussed.

The paper given by P. Hagenmuller is an application of electrical and magnetic measurements on vanadium bronzes in order to deduce the valence state of the metal atoms and to find a relation between the properties and the crystal structures of the bronzes.

Stoichiometry, structure and disorder in solid ionic conductors by W. L. Roth is a review of super ionic conductors of two kinds, namely β-alumina and calcia-stabilized zirconia. The influence of defects and disorder is excellently described.

Of great interest is the stability of different coordination of atoms in solids. C. Haas has illustrated the stability of the trigonal-prismatic coordination of transition-metal atoms with respect to the more common octahedral one. He also gives examples of methods used to measure the energy levels of electrons in molecules.

The Madelung part of the lattice energy (MAPLE), has been used as a tool to approach the problem of long-range order. A survey of calculations of MAPLE by R. Hoppe includes many tables with values of several structures.

A very interesting question is the following: why do certain compounds exist when others do not? Miedema, Boom and de Boer demonstrate in the paper *Simple rules for alloying* a model based on energy effects for metallic alloys. The model used accounts for the heat of formation of solid as well as liquid alloys and is primarily applied to binary compounds. The documentation is overwhelming and includes alloys of two transition-metals, transition-alkali (or alkali-earth) metals and *d*-metals–*p*-metals. The exceptions from 'the simple rules' are rather few.

Two main aspects of the ionic model are discussed by W. C. Nieuwpoort, *viz.* the suggested charge distribution in compounds and calculations of the cohesion energies of ion arrangements.

Applications of the crystal field theory are also surveyed. The last paper written by L. Jansen is an extensive review of the *Triple interaction model in ionic solids.* The three-ion exchange-forces theory is described and is in good agreement with the experimental data when coupled to the Hund–Born–Mayer model. The crystal stability of NaCl and CsCl type structures is discussed as well as the sphalerite and wurtzite configurations. Stability of compositions AX_2, polymorphism of solids of compounds with closed *d*-shells and stability of rare-gas compounds are described in a splendid way.

Solid-state chemists with an interest in the relation between physical properties, chemical bonding and crystal structure will find this collection of papers of considerable interest.

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Molecular structure – the physical approach. By J. C. D. BRAND and J. C. SPEAKMAN, 2nd edition revised by J. C. SPEAKMAN and J. K. TYLER. Pp. vi+367, Figs. 120, Tables 69. London: Arnold, 1975. Price £11.00, paper £5.50.

A review of this book by M. Nardelli has been published in the January issue of *Acta Crystallographica*, Section B, page 317.

Molecular structure by diffraction methods. Vol. 3. By G. A. SIM and L. E. SUTTON (Senior Reporters). Pp. xiv+514, Figs. 89, Tables 47. The Chemical Society, 1975, Price £26.00 (US $71.50).

A review of this book by A. Vos has been published in the January issue of *Acta Crystallographica*, Section B, page 318.