



Crystal Structures and Cation Sites in the Rock-Forming Minerals

Joseph R. Smyth, David L. Bish

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Intended to become the standard reference work on rock-forming mineral structures, this book is the end-product of a five-year project. The authors have recalculated, compiled and presented mineral structure and cation site data in a form that will be useful to a broad range of geophysical scientists seeking a deeper understanding of physical properties and element distributions in natural systems. Cation radius relative to site size, and cation charge relative to site electrostatic potential, are the two dominant factors that control distributions of major, minor, and trace lithophile elements among mineral phases and sites within minerals. Cation radii and charges have been available for some time, but not until now has there been a systematic compilation of structural data, particularly mean cation-anion distances and electrostatic energies. This volume covers the principal rock-forming silicates, oxides, hydroxides, carbonates, sulphates, phosphates, and halides. For each structure, cell parameters, cell volume, molar volume, density, formula, and formula weight are presented. For each cation site, positional parameters, site symmetry, Wyckoff notation, nearest-neighbour distances, mean distances, standard deviation of distance, variance of central bond angle, quadratic elongation, and electrostatic energy are presented. All data, except for cell parameters and atom positions, are original calculations unique to this volume. Original polyhedral drawings of most of the structure types are also included. Mineralogists, petrologists, geochemists and geophysicists will find this unique book very useful. It may also serve as an advanced text for students in these fields.

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