

Brief Contents

Preface, xiii

1 Introduction, 1

PART I CRYSTAL CHEMISTRY, 7

2 Atomic Structure, 9

3 Chemical Bonding, 23

PART II CHEMICAL REACTIONS, 49

4 Basic Thermodynamic Concepts, 51

5 Thermodynamics of Solutions, 79

6 Geothermometry and Geobarometry, 107

7 Reactions Involving Aqueous Solutions, 134

8 Oxidation–Reduction Reactions, 167

9 Kinetics of Chemical Reactions, 197

PART III ISOTOPE GEOCHEMISTRY, 223

10 Radiogenic Isotopes, 225

11 Stable Isotopes, 253

PART IV THE EARTH SUPERSYSTEM, 281

12 The Core–Mantle–Crust System, 283

13 The Crust–Hydrosphere–Atmosphere System, 326

APPENDIX 1 *Units of measurement and physical constants, 372*

APPENDIX 2 *Electronic configurations of elements in ground state, 374*

APPENDIX 3 *First ionization potential, electron affinity, electronegativity (Pauling scale), and coordination numbers of selected elements, 377*

APPENDIX 4 *Thermodynamic symbols, 379*

APPENDIX 5 *Standard state (298.15 K, 10⁵ Pa) thermodynamic data for selected elements, ionic species, and compounds, 382*

APPENDIX 6 *Fugacities of H₂O and CO₂ in the range 0.5–10.0 kbar and 200–1000°C, 396*

APPENDIX 7 *Equations for activity coefficients in multicomponent regular solid solutions, 398*

APPENDIX 8 *Some commonly used computer codes for modeling of geochemical processes in aqueous solutions, 400*

APPENDIX 9 *Solar system abundances of the elements in units of number of atoms per 10⁶ silicon atoms, 402*

APPENDIX 10 *Answers to selected chapter–end questions, 403*

References, 406

Index, 431