GRANDE PRAIRIE REGIONAL COLLEGE DEPARTMENT OF SCIENCE AND TECHNOLOGY

2002/2003

CHEMISTRY 1010: Introductory University Chemistry I

SECTION: A3

PREREQUISITE: Chemistry 30 or equivalent

INSTRUCTOR: Barry Ramaswamy Office J218 539-2072

TEXT BOOK: CHEMISTRY 5th Edition

Steven S. Zumdahl and Susan A. Zumdahl Houghton Mifflin Company ©2000

LABORATORY: Chemistry 101 Experiments, University of Alberta, 2002/2003

Lab coats and safety glasses are compulsory, and are avail-

able at the Bookstore.

A Laboratory Breakage Deposit of \$30 per Chemistry course must be paid to the Cashier (Room C315), and the receipt must be shown to the Laboratory Technician (Mrs. Omana Pillay) during

the first Laboratory class.

SEMINAR: Seminars consist of problem solving, discussion of lecture materials, and a brief introduction to the upcoming Laboratory experi-

ment. A short quiz will be part of most seminars.

COURSE EVALUATION

February Midterm	20%
March Midterm	20%
Final Exam	38%
Quizzes	
Laboratory Reports	12%
Laboratory Exam	8%

Assignments will be distributed on a weekly basis. These assignments will not be graded, but answers and complete solutions will be available for the student. Completion of assignments is strongly recommended to succeed in the course.

Attendance to all lectures and seminars is strongly recommended. Laboratory attendance to each specific experiment is compulsory; a passing grade in the laboratory component is required to pass the course. A doctor's medical note is required for all excused absences!

Students are required to maintain an overall average of 50% or better to pass the course.

According to GPRC policy (see page 34 of the 2002/2003 calendar), a repeat final examination will not be granted in this course.

CH1010 COURSE CONTENT

A. Matter and Stockdinometry A.1 Units, dimensional analysis A.2 Naming simple compounds A.3 The mode A.4 Empirical and molecular formula of a compound A.5 Calculations involving a limiting reagent A.6 Aqueous solutions and molarity A.7 Precipitation reactions B. Chemical Equilibrium B.1 Equilibrium condition B.2 Mass-action expression and the equilibrium constant B.3 Heterogeneous equilibria B.4 Applications of the equilibrium constant B.5 Le Châtelier's Principle C: Acids and Bases C.2 Acids and Bases C.2 Acids and Bases C.3 Acids trength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Duffer systems C.10 Acid/base indicators D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Boltr midel D.4 Quantum mechanics and the atom D.5 Orbital shapes and emergies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Tends in atomic properties E. Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.5 Bond emergies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F. Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkalim eaarts F.3 Halogens F.4 Noble gases F.5 Other main group elements F.5 Other main group elements	A. Ma	tter and Staidhiometry	A Maximirate 1 14 M	4 12 1 115
A.2 Naming simple compounds A.3 The mole A.4 Empirical and molecular formula of a compound A.5 Calculations involving a limiting reagent A.6 Aqueous subutions and molarity A.7 Precipitation reactions B: Chemical Equilibrium Chapter 13 Pages 611-655 B.1 Equilibrium condition B.2 Mass-action expression and the equilibrium constant B.3 Heterogeneous equilibria B.4 Applications of the equilibrium constant B.5 Le Châteller's Principle C: Acids and Bases Chapters 14 and 15 Pages 657-757 C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base ithrations C.10 Acid/base indicators D: Atomic Structure D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bolir midel D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Tends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Lonic bonding E.5 Isomic energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.5 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases			Chapters 1, 2, a,	# 1.98cz 1-100
A.3 The mole A.4 Empirical and molecular formula of a compound A.5 Calculations involving a limiting reagent A.6 Appears solutions and molarity A.7 Precipitation reactions B: Chemical Equilibrium Chapter 13 Pages 611-655 B: Chemical Equilibrium omdition B.2 Mass-action expression and the equilibrium constant B.3 Heterogeneous equilibria B.4 Applications of the equilibrium constant B.5 Le Châteler's Principle C: Acids and Bases C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strung/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Duffer systems C.10 Acid/base intrations C.10 Acid/base intrations C.11 Acid/base intrations C.12 Acid strength and the Boltr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures, octet rule, resonnance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization F.1 Allali metals F.2 Allaline earths F.3 Halogens F.4 Noble gases				
A.4 Empirical and molecular formula of a compound A.5 Calculations involving a limiting reagent A.6 Aqueous sulutions and molarity A.7 Precipitation reactions B: Chemical Equilibrium B: 1 Equilibrium condition B.2 Mass-action expression and the equilibrium constant B.3 Heterogeneous equilibria B.4 Applications of the equilibrium constant B.5 Le Châteller's Principle C: Acids and Bases C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strung/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Duffer systems C.10 Acid/base indicators D: Atomic Structure D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bolar model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonnance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Allali metals F.2 Allaline earths F.3 Halogens F.4 Noble gases				
A.5 Calculations involving a limiting reagent A.6 Aqueous solutions and molarity A.7 Precipitation reactions B: Chemical Equilibrium B.1 Equilibrium condition B.2 Mass-action expression and the equilibrium constant B.3 Heterogeneous equilibria B.4 Applications of the equilibrium constant B.5 Le Châtelier's Principle C: Acids and Bases C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Cabculating the pH of strung/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base indicators D: Atomic Structure D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures, octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F. Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases			compound	
A.6 Aqueous solutions and molarity A.7 Precipitation reactions B: Chemical Equilibrium B: 1 Equilibrium condition B: 2 Mass-action expression and the equilibrium constant B: 3 Heterogeneous equilibria B: 4 Applications of the equilibrium constant B: 5 Le Châtelier's Principle C: Acids and Bases C: 1 The nature of acids and bases C: 2 Acid strength and the pH scale C: 3 Calculating the pH of strung/weak acids C: 4 Bases C: 5 Salts C: 6 Mixtures of weak acids and bases C: 7 Effect of structure upon acid strength C: 8 Common ion effect C: 9 Buffer systems C: 10 Acid/base thrations C: 10 Acid/base indicators D: Atomic Structure D: 2 Electromagnetic radiation D: 3 Atomic spectra and the Bolir model D: 4 Quantum mechanics and the atom D: 5 Orbital shapes and energies D: 6 Many-electron atoms D: 7 Building of the periodic table D: 8 Trends in atomic properties E: Chemical Bonding C: 1 Types of chemical bonds and electronegativity E: 2 lonic bonding E: 3 Lattice energy E: 4 Covalent bonding E: 5 Bond energies and chemical reactions E: 6 Lewis structures; octet rule, resonance, formal charge, exceptions E: 7 YSEPR theory and molecular shape E: 8 Hybridization E: Melecular orbital theory Optional F: Chemistry of the Main Group Elements F: Alkalime earths				
B: Chemical Equilibrium B: Chemical Equilibrium condition B: Paques of the equilibrium constant B: Applications of the equilibrium constant B: Applications of the equilibrium constant B: Le Châtelier's Principle C: Acids and Bases C: Applications of the equilibrium constant C: Acids and Bases C: Acid strength and the pH scale C: Acids and Bases C: Acid strength and the pH scale C: Bases C: Salts C: Bifect of structure upon acid strength C: Buffer systems C: Differ systems C: Dif			1116	
B: Chemical Equilibrium condition B-1 Equilibrium condition B-2 Mass-action expression and the equilibrium constant B-3 Heterogeneous equilibria B-4 Applications of the equilibrium constant B-5 Le Châtelier's Principle C: Acids and Bases Chapters 14 and 15 Pages 657-757 C: Acids and Bases Chapters 14 and 15 Pages 657-757 C: Acid strength and the pH scale C-3 Calculating the pH of strong/weak acids C-4 Bases C-5 Salts C-6 Mixtures of weak acids and bases C-7 Effect of structure upon acid strength C-8 Cammon ion effect C-9 Buffer systems C-10 Acid/base titrations C-10 Acid/base indicators D: Atomic Structure D-1 Introduction to Atomic Structure D-2 Electromagnetic radiation D-3 Atomic spectra and the Bohr model D-4 Quantum mechanics and the atom D-5 Orbital shepes and energies D-6 Many-electron atoms D-7 Building of the periodic table D-8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E-7 Lattice energy E-4 Covalent bonding E-5 Bond energies and chemical practions E-6 Lewis structures; octet rule, resonance, formal charge, exceptions E-7 VSEPR theory and molecular shape E-8 Hybrichization E-9 Molecular orbital theory Optionat F: Chemistry of the Main Group Elements F-1 Alkalia metals F-2 Alkalia metals F-2 Alkalia metals F-3 Halogns F-4 Noble gases				
B-1 Equilibrium condition B-2 Mass-action expression and the equilibrium constant B-3 Heterogeneous equilibria B-4 Applications of the equilibrium constant B-5 Le Châteller's Principle C: Acids and Bases Chapters 14 and 15 Pages 657-757 C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base indicators D: Atomic Structure D.2 Electromagnetic radiation D.3 Atomic Structure D.2 Electromagnetic radiation D.3 Atomic supercra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shepse and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent honding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Allaline earths F.3 Halogns F.4 Noble gases			***************************************	
B.2 Mass-action expression and the equilibrium constant B.3 Heterogeneous equilibrium constant B.4 Applications of the equilibrium constant B.5 Le Châtelier's Principle C: Acids and Bases Chapters 14 and 15 Pages 657-757 C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Cabulating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base titrations C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent honding E.5 Bond energies and chemical reactions E.6 Lewis structures, octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization D.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Allsali metals F.2 Allsaline earths F.3 Halogns F.4 Noble gases			Chapter 13	Pages 611-655
B.3 Heterogeneous equilibria B.4 Applications of the equilibrium constant B.5 Le Châtelier's Principle C: Acids and Bases C.2 C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Duffer systems C.10 Acid/base indicators D: Atomic Structure D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bolar model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F: Alkalim earths F: Alkalime eart			Fall Committee and Committee a	
B-4 Applications of the equilibrium constant B-5 Le Châtelier's Principle C: Acids and Bases C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salus C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base indicators C.10 Acid/base indicators D: Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters E: Chemical bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.5 Lettice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F: Alkalim eearths F: Alkalim earths F: Alkalime e	13	.2 Mass-action expression and the equilit	prium constant	
B.5 Le Châtelier's Principle C: Acids and Bases C.1 The mature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base infractors C.10 Acid/base infractors C.10 Acid/base infractors C.10 Acid/base infractors D: Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bolt model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity C.1 Introductions C.1 Chapters S and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity C.1 Chapters S and 9 Pages 349-438 E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F: Alkalim earths F: Alkalime				
C: Acids and Bases C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Cammon ion effect C.9 Buffer systems C.10 Acid/base ithrations C.10 Acid/base intrations C.11 Introduction to Atomic Structure D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in natomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	13	4 Applications of the equilibrium consta	int	
C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Cammon ion effect C.9 Buffer systems C.10 Acid/base indicators C.10 Acid/base indicators D: Atomic Structure D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters S and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.5 Bond energies and chemical reactions E.6 Lewis structures, octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Allali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	В	.5 Le Châtelier's Principle		
C.1 The nature of acids and bases C.2 Acid strength and the pH scale C.3 Cabulating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base indicators C.10 Acid/base indicators C.10 Acid/base indicators D: Atomic Structure C.11 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding C.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.5 Littice energy E.4 Covaleant houding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Coptional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	C: Aci	ds and Bases	Chapters 14 and 15	Pages 657-757
C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Cammon ion effect C.9 Buffer systems C.10 Acid/base ittrations C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optimal F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
C.3 Calculating the pH of strong/weak acids C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Cammon ion effect C.9 Buffer systems C.10 Acid/base ittrations C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optimal F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	C	2 Acid strength and the pH scale		
C.4 Bases C.5 Salts C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base indicators C.10 Acid/base indicators D: Atomic Structure	C	3.3 Calculating the pH of strong/weak aci	ids	
C.6 Mixtures of weak acids and bases C.7 Effect of structure upon acid strength C.8 Common ion effect C.9 Buffer systems C.10 Acid/base titrations C.10 Acid/base titrations C.10 Acid/base indicators D: Atomic Structure D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohn model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters S and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkalim esarths F.2 Alkalim esarths F.3 Halogens F.4 Noble gases		The second second		
C.7 Effect of structure upon acid strength C.8 Cammon ion effect C.9 Buffer systems C.10 Acid/base titrations C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bolir model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkalim etaits F.2 Alkalime earths F.3 Halogens F.4 Noble gases	C	.5 Salts		
C.8 Common ion effect C.9 Buffer systems C.10 Acid/base titrations C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bolir model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkalim carths F.2 Alkaline earths F.3 Halogens F.4 Noble gases	C	6 Mixtures of weak acids and bases		
C.8 Common ion effect C.9 Buffer systems C.10 Acid/base titrations C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bolir model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkalim carths F.2 Alkaline earths F.3 Halogens F.4 Noble gases	C	.7 Effect of structure upon acid strength		
C.10 Acid/base iditations C.10 Acid/base indicators D: Atomic Structure	C	8 Common ion effect		
C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	C	.9 Buffer systems		
C.10 Acid/base indicators D: Atomic Structure Chapters 2 and 7 Pages 39-55 and Pages 291-347 D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	C	.10 Acid/base titrations		
D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	C	.10 Acid/base indicators		
D.1 Introduction to Atomic Structure D.2 Electromagnetic radiation D.3 Atomic spectra and the Bohr model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	D: Ato	mic Structure	Chapters 2 and 7 Pages 39-55 and	Pages 291-347
D.3 Atomic spectra and the Bolin model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Allali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	D	I Introduction to Atomic Structure		3
D.3 Atomic spectra and the Bolin model D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Allali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	T	.2 Electromagnetic radiation		
D.4 Quantum mechanics and the atom D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
D.5 Orbital shapes and energies D.6 Many-electron atoms D.7 Building of the periodic table D.8 Trends in atomic properties E: Chemical Bonding E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	D	.4 Quantum mechanics and the atom		
D-6 Many-electron atoms D-7 Building of the periodic table D-8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	D	.5 Orbital shapes and energies		
D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
D.8 Trends in atomic properties E: Chemical Bonding Chapters 8 and 9 Pages 349-438 E.1 Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	D	T Building of the periodic table		
E: Chemical Bonding E.I. Types of chemical bonds and electronegativity E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
E.1 Types of chemical bonds and electronegativity E.2 ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F; Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Altali metals F.2 Altaline earths F.3 Halogens F.4 Noble gases			Chartest 8 and 0	Dames 710, 420
E.2 Ionic bonding E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	-		orativity	1 ugos -543 -400
E.3 Lattice energy E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F; Chemistry of the Main Group Elements F.1 Albali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	100		Suntai	
E.4 Covalent bonding E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
E.5 Bond energies and chemical reactions E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
E.6 Lewis structures; octet rule, resonance, formal charge, exceptions E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
E.7 VSEPR theory and molecular shape E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases		6 Lewis structures; octet rule resonance	formal charge expensions	
E.8 Hybridization E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	E	.7 VSEPR theory and molecular shape	to make the graph of the constraint	
E.9 Molecular orbital theory Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
Optional F: Chemistry of the Main Group Elements F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases				
F: Chemistry of the Main Group Elements Chapters 18 and 19 Pages 889-961 F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases	19 W S			
F.1 Alkali metals F.2 Alkaline earths F.3 Halogens F.4 Noble gases		mistry of the Main Grown Elements	Charten 18 and 10	D 200 021
F.2 Alkaline earths F.3 Halogens F.4 Noble gases	The second secon		Complete to said 19	1 office 998-801
F.3 Halogens F.4 Noble gases				
F.4 Noble gases		The state of the s		
		200		