

## MOLECULAR LABS

### Chemical Matter

- 1 Characterizing the Physical States of Bromine and Chlorine
- 2 Examining Two-Dimensional Models for the States of Matter
- 3 Classifying Chemical and Physical Properties

### Thermochemistry

- 4 Measuring the Specific Heat
- 5 Factors That Affect the Thermal Energy
- 6 The Reaction Energetics of Nitroglycerin

### Atoms and Periodicity

- 7 Nuclei and Electrons in Atoms
- 8 Examining the Electron Cloud of an Atom
- 9 Comparing s- and p-Orbitals
- 10 The Structure of an Atom with d-Orbitals
- 11 The Ionic Radius for Different Oxidation States
- 12 Comparing the Size of Isoelectronic Ions

### Chemical Bonding

- 13 Covalent Bonding in Chlorine and Nitrogen
- 14 Ionic Bonding in Magnesium Chloride
- 15 Classifying Diatomic Molecules by Bond Polarity
- 16 Compounds with Polyatomic Ions
- 17 Resonance of Carbonate Ion and Ozone
- 18 Predicting and Analyzing Molecular Shapes

### Gases

- 19 Measuring Gas Pressure
- 20 Temperature Scales in Chemistry
- 21 Standard Temperature and Pressure
- 22 Comparing the Density of Liquids and Gases
- 23 Particle Trajectories in the Gas Phase
- 24 How Often Do Gas Molecules Collide?
- 25 The Ability of Gases to Mix
- 26 The Pressure-Volume Relationship for Gases
- 27 The Pressure-Temperature Relationship for Gases
- 28 How Fast Do Gas Molecules Move?
- 29 Mean Speed and Temperature
- 30 The Distribution of Kinetic Energies
- 31 The Maxwell-Boltzmann Distribution of Speeds
- 32 Speed Distribution and Temperature
- 33 Speed Distribution and Molar Mass
- 34 The Effusion of Gas Mixtures
- 35 The Behavior of Gases at High Pressure

### Liquids and Solids

- 36 Comparing Molecular Motion in the Three States of Matter
- 37 Fundamental Characteristics of Solids
- 38 Translational and Rotational Motion in Liquids
- 39 Kinetic and Cohesive Energy in the Three States of Matter

- 40 Probing Dipole-Dipole Forces
- 41 Experimenting with Ion-Dipole Forces
- 42 Structure and Dynamics of Liquid Water
- 43 Hydrogen Bonding in Mixtures
- 44 Bonding in Crystalline Solids

### Solutions

- 45 Specifying the Concentration of a Dissolved Pesticide
- 46 Solvation in Aqueous Ionic Solutions
- 47 The Hydration Energy of Simple Cations and Anions
- 48 Hydration Energy and Ionic Charge

### Acids and Bases

- 49 Molecular Structure and Acid Strength

### Kinetics

- 50 Reactive Collisions between Molecules
- 51 Examining a Reaction Mechanism
- 52 Finding the Rate Law of a Reaction

### Equilibria

- 53 Chemical Equilibrium and Temperature
- 54 Chemical Equilibrium and Pressure

### Chemical Thermodynamics

- 55 The Entropy of the Phases of Iodine
- 56 Temperature Dependence of the Entropy of Gases

### Transition Metal Complexes

- 57 Identifying Stereoisomers

### Organic Chemistry

- 58 The Bonding Characteristics of Carbon
- 59 Structure and Properties of Straight-Chain Alkanes
- 60 Isomers of Saturated Hydrocarbons
- 61 Isomers of Unsaturated Hydrocarbons
- 62 Structure and Stability of Cycloalkanes
- 63 The Properties of Ethene and Ethyne
- 64 The Stability of Benzene
- 65 Identifying Functional Groups
- 66 Structure and Hydrogen Bonding of Alcohols
- 67 The Strength of Carboxylic Acids
- 68 Structure and Properties of Esters
- 69 Describing a Nucleophilic Substitution

### Biochemistry

- 70 The Structure of Amino Acids
- 71 Building a Model of a Protein
- 72 Examining Models of Starch
- 73 The Chemical Composition of DNA
- 74 The Structure of Nucleotides
- 75 Building a Model of DNA