

 **POWER BASICS**[®]

Chemistry

Teacher's Guide

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To the Teacher

Overview

Power Basics® is a complete textbook program designed to meet the needs of students who are daunted by the length and complexity of traditional textbooks. The goal of all textbook programs is to provide students with important new information. However, in traditional textbook programs, this goal is often overshadowed by other considerations. Many textbooks are written for the above-average reader and cover a wide range of content. They are filled with photographs, illustrations, and other visual elements. For some students, the amount of material is overpowering, the visual elements are distracting, and the rapid pace is unnerving. In *Power Basics*®, we revisited the basic goal, developing a streamlined textbook program that presents the essential content students need to succeed.

Program Components

As with traditional textbook programs, *Power Basics*® includes a core textbook and ancillary products designed to round out the program. The student text provides coverage of the essential content in each subject area. A consumable workbook provides a variety of activities for each lesson, including practice activities, extension activities, and activities designed for different learning styles.

Teacher support materials include a teacher's guide and test pack for each student text. The teacher's guide includes the following: an overview of each unit in the student text; suggestions for extension activities; the student text glossary and appendixes; a complete answer key to all practice activities and unit reviews in the student text; classroom record-keeping forms; and graphic organizers for student use.

For more detailed assessments, the test pack offers a pretest, unit tests for each unit in the student text, a posttest, scoring keys, and test-taking strategies for students.

Student Text Organization

The student text is divided into units. Each unit contains a series of lessons on related topics, with one lesson for each topic. Each lesson begins with a clear,

student-centered goal and a list of key words that are introduced in the lesson. The definitions for these words are included in the teacher material for each lesson.

Next comes a brief introduction to the topic of the lesson, followed by instructional text that presents essential information in short, easy-to-understand sections. Each section of instructional text is followed by a practice activity that lets students apply what they have just learned. A unit review is provided at the end of each unit to assess students' progress. The review is followed by an application activity that encourages students to extend and apply what they have learned.

The student text also includes several special features. "Think About It" sections ask students to use critical-thinking skills. "Tip" sections give students useful hints to help them remember specific pieces of information in the student text. "In Real Life" sections show students how the material they are learning connects to their own lives, answering the perennial question, "When am I ever going to use this?"

The reference section at the back of the student text includes a summary of rules and other important information presented in the text, a glossary (with pronunciation guide) that includes all vocabulary in the Words to Know sections, and an index to help students locate information in the text.

Record-Keeping Forms

To make record-keeping easier, we have provided reproducible class charts that you can use to track students' progress. Fill in your students' names, and make copies of the chart for each unit in the student text. Add lesson numbers, lesson titles, and practice numbers as needed. We have also provided a generic grading rubric for the application activities in the student text so that these activities may be assigned for credit, if you wish. You may customize the rubric by adding more grading criteria or adapting the criteria on the sheet to fit your needs.

We're pleased that you have chosen to Power Up your Basic Skills Curriculum with *Power Basics*®!

To the Teacher, *continued*

Guide to Icons

Teacher's Guide



Teaching Tip

Practical suggestions help you to engage students in the learning process.



Thinking Skills

Helpful suggestions increase students' ability to think critically.



Fascinating Facts

These tidbits of information are guaranteed to pique your students' interest.



Differentiation

Different approaches to the content gives all learners the opportunity to connect to the material.

Student Text



Tip

Tips give helpful hints to boost understanding and retention.



Think About It

These sections develop critical-thinking.



In Real Life

These features connect learning concepts to students' lives, answering the perennial question, "When am I ever going to use this?"

Workbook



Reinforcement

Reinforcement activities give students additional opportunities to practice what they have learned.



Multiple Intelligences

Different approaches capitalize on different learning styles and interests to help all students connect to the material.



Extension

Deepen and broaden learning with critical-thinking activities, real-life applications, and more.

Classroom Management

Student Name	Lesson No.:		Title:							
	Practice #	Practice #	Practice #	Practice #	Practice #	Practice #	Practice #	Practice #	Practice #	Unit Review Score
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
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22.										
23.										
24.										
25.										
26.										
27.										
28.										
29.										
30.										

Application Activity Rubric

Name _____ Date _____

Unit _____ Activity _____

POINTS	4 all of the time	3 most of the time	2 some of the time	1 almost none of the time
followed directions				
organized material well				
used appropriate resources				
completed the entire activity				
showed an understanding of the content				
produced error-free materials				
drew logical conclusions				
where appropriate, listed sources used				

Use Chart

POWER BASICS WORKBOOK

STUDENT TEXT PRACTICE

Unit 1: Matter and Measurement

Activity 1: What Is Chemistry?	Practice 1: What Is Chemistry?
Activity 2: Antoine Lavoisier	Practice 1: What Is Chemistry?
Activity 3: The Scientific Method	Practice 2: The Scientific Method
Activity 4: Substances and Mixtures	Practice 3: Substances and Mixtures
Activity 5: Homogeneous and Heterogeneous Mixtures	Practice 4: Homogeneous and Heterogeneous Mixtures
Activity 6: Elements and Compounds	Practice 5: Elements and Compounds
Activity 7: Elements and Their Symbols	Practice 6: Elements and Their Symbols
Activity 8: Elements and Their Symbols II	Practice 6: Elements and Their Symbols
Activity 9: Molecules	Practice 7: Molecules
Activity 10: Chemical Formulas	Practice 8: Chemical Formulas
Activity 11: Writing Binary Formulas	Practice 8: Chemical Formulas
Activity 12: Solids, Liquids, and Gases	Practice 9: Solids, Liquids, and Gases
Activity 13: Physical Changes and Chemical Changes	Practice 10: Physical Changes Versus Chemical Changes
Activity 14: Changes of State	Practice 11: Changes of State
Activity 15: Units of Measurement	Practice 12: Units of Measure
Activity 16: Converting Between Different Units	Practice 13: Converting Between Different Units
Activity 17: Sir Isaac Newton	Practice 13: Converting Between Different Units
Activity 18: Series of Unit Conversions	Practice 14: Series of Unit Conversions
Activity 19: Mass and Weight	Practice 15: Mass and Weight
Activity 20: Volume and Density	Practice 16: Volume and Density
Activity 21: Temperature and Heat	Practice 17: Temperature and Heat
Activity 22: Temperature Scales—Celsius to Fahrenheit to Kelvin	Practice 18: Temperature Scales
Activity 23: Scientific Notation	Practice 19: Scientific Notation

Unit 2: Properties of Matter

Activity 24: Dalton's Atomic Theory	Practice 20: Dalton's Atomic Theory
Activity 25: John Dalton	Practice 20: Dalton's Atomic Theory
Activity 26: Joseph Proust	Practice 20: Dalton's Atomic Theory
Activity 27: Electrons, Protons, and Neutrons	Practice 21: Electrons, Protons, and Neutrons
Activity 28: Crookes, Thomson, and Rutherford	Practice 21: Electrons, Protons, and Neutrons
Activity 29: Light	Practice 21: Electrons, Protons, and Neutrons
Activity 30: Max Planck and James Clerk Maxwell	Practice 21: Electrons, Protons, and Neutrons
Activity 31: Atomic Number and Mass Number	Practice 22: Atomic Number and Mass Number
Activity 32: Henry Moseley	Practice 22: Atomic Number and Mass Number
Activity 33: Isotopes and Average Atomic Mass	Practice 23: Isotopes
Activity 34: Atomic Mass and Molecular Mass	Practice 24: Atomic Mass and Molecular Mass
Activity 35: Periodic Trends	Practice 25: What Is the Periodic Table?
Activity 36: Mendeleev	Practice 25: What Is the Periodic Table?

Use Chart, *continued*

POWER BASICS WORKBOOK

STUDENT TEXT PRACTICE

Activity 37: Categories of the Elements	Practice 26: Categories of the Elements
Activity 38: Metals, Nonmetals, and Metalloids	Practice 27: Metals, Nonmetals, and Metalloids
Activity 39: Alkali Metals and Alkaline Earth Metals	Practice 28: Alkali Metals and Alkaline Earth Metals
Activity 40: The Halogens and Noble Gases	Practice 29: The Halogens and the Noble Gases
Activity 41: Anions and Cations	Practice 30: Anions and Cations
Activity 42: Drawing Dot Diagrams	Practice 30: Anions and Cations
Activity 43: Naming Ionic Compounds	Practice 31: Ionic Compounds
Activity 44: Writing Ionic Formulas	Practice 32: Molecular Formulas and Empirical Formulas
Activity 45: Naming Ionic Compounds with Polyatomic Ions	Practice 32: Molecular Formulas and Empirical Formulas
Activity 46: Writing Ionic Formulas with Polyatomic Ions	Practice 32: Molecular Formulas and Empirical Formulas
Activity 47: Structural Formulas and Chemical Bonds	Practice 33: Structural Formulas and Chemical Bonds
Activity 48: The Mole and Avogadro's Number	Practice 34: The Mole and Avogadro's Number
Activity 49: Amedeo Avogadro	Practice 34: The Mole and Avogadro's Number
Activity 50: Molar Mass	Practice 35: Molar Mass
Activity 51: Atomic and Ionic Radii	Practice 38: Atomic and Ionic Radii

Unit 3: Transformations of Matter

Activity 52: Writing Skeleton Equations	Practice 39: Writing Chemical Equations
Activity 53: Reading Equations	Practice 39: Writing Chemical Equations
Activity 54: Balanced Versus Unbalanced Chemical Equations	Practice 40: Balanced Versus Unbalanced Chemical Equations
Activity 55: Balancing Chemical Equations	Practice 41: Balancing Chemical Equations
Activity 56: Balancing Complete Equations	Practice 41: Balancing Chemical Equations
Activity 57: Molar Ratios	Practice 42: Molar Ratios
Activity 58: Mole–Mole Conversions	Practice 43: Mole–Mole Conversions
Activity 59: Mass–Mole Conversions	Practice 44: Mass–Mole Conversions
Activity 60: Mass–Mass Conversions	Practice 45: Mass–Mass Conversions
Activity 61: Mass–Mole–Particle Conversions	Practice 46: Mass–Mole–Number Conversions
Activity 62: Mass–Volume Conversions	Practice 46: Mass–Mole–Number Conversions
Activity 63: Limiting Reactants	Practice 47: Limiting Reactants
Activity 64: Reaction Yields	Practice 48: Reaction Yields
Activity 65: Ionic Bonding	Practice 49: Ionic Bonding
Activity 66: Properties of Ionic Compounds	Practice 50: Properties of Ionic Compounds
Activity 67: Covalent Bonding	Practice 51: Covalent Bonding
Activity 68: Electronegativity	Practice 52: Electronegativity
Activity 69: Properties of Covalent Compounds	Practice 53: Properties of Covalent Compounds
Activity 70: Properties of Metals	Practice 55: Properties of Metals
Activity 71: The Arrangement of Metal Atoms	Practice 55: Properties of Metals

Use Chart, *continued*

POWER BASICS WORKBOOK

STUDENT TEXT PRACTICE

Unit 4: Topics in Chemistry

Activity 72: Dipole Moments	Practice 58: Dipole Moments
Activity 73: Hydrogen Bonding	Practice 60: Hydrogen Bonding
Activity 74: Types of Solids	Practice 62: Types of Solids
Activity 75: Johannes van der Waals	Practice 63: Properties of Liquids
Activity 76: Properties of Liquids	Practice 63: Properties of Liquids
Activity 77: Boyle's Law Problems	Practice 64: Behavior of Gases
Activity 78: Charles's Law Problems	Practice 64: Behavior of Gases
Activity 79: Combined Gas Law Problems	Practice 64: Behavior of Gases
Activity 80: Ideal Gas Law Problems	Practice 64: Behavior of Gases
Activity 81: Boyle and Charles	Practice 64: Behavior of Gases
Activity 82: What Is a Solution?	Practice 65: What Is a Solution?
Activity 83: Solubility of Solids in Water	Practice 67: Solubility of Solids
Activity 84: Solubility of Gases in Water	Practice 68: Solubility of Gases
Activity 85: Solubility of Liquids, Solids, and Gases	Practices 66, 67, and 68: Solubility of Liquids, Solids, and Gases
Activity 86: The Effect of Temperature and Pressure on Solubility	Practices 69: The Effect of Temperature and Pressure on Solubility
Activity 87: Colligative Properties	Practice 70: Colligative Properties
Activity 88: What Are Acids and Bases?	Practice 71: What Are Acids and Bases?
Activity 89: Svante Arrhenius	Practice 71: What Are Acids and Bases?
Activity 90: Measuring Acidity—pH	Practice 73: Measuring Acidity: pH and Indicators

gas
liquid
melting

melting point
physical change
physical properties

solid
sublimation

Lesson 4—Measuring Matter

Goal: To learn how scientists measure things

WORDS TO KNOW

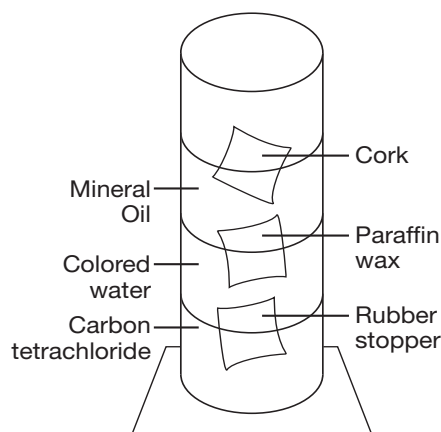
absolute zero	Fahrenheit scale	scientific notation
Celsius scale	heat	temperature
conversion factor	Kelvin scale	volume
density	mass	weight

Notes on Application Activities in Student Text

Activity	Skills Applied	Product
Metric Calculation Versus English Calculation	measuring, calculating areas, comparing units	measurement comparison
Freshwater and Saltwater Boiling Points	observing, measuring, drawing conclusions	graph
Rubber Versus Mylar [®]	observing, reasoning	chart

Additional Activity Suggestion

- Demonstrate density differences for learners. Using a 250 ml graduated cylinder, place each of the following in order (about 25 to 30 ml of each liquid will be enough): carbon tetrachloride; rubber stopper; colored water; piece of paraffin wax (or a small piece of candle); mineral oil; cork. Ask learners why the liquids remain in layers and why the solid objects have the positions shown in the diagram at the right.



Teaching Tip

- Learners often have difficulty setting up a graph. Explain the differences between independent and dependent variables. Explain how to determine which is which and that dependent variables always lie on the y-axis, while independent variables always lie on the x-axis.

Unit 2: Properties of Matter

This unit introduces basic information about atoms and molecules. In Lesson 5, students will explore the internal structure of atoms. Lesson 6 presents the periodic table of elements and shows students how chemical information is organized. In Lesson 7, students will learn about ions, chemical formulas, and how chemists count using the mole. Lesson 8 discusses how the properties of atoms vary across the periodic table.

Lesson 5—The Structure of Matter

Goal: To learn about the internal structure of atoms

WORDS TO KNOW

atomic mass	coulombs	molecular mass
atomic mass unit	electrons	neutrons
atomic number	isotopes	protons
cathode-ray tube	mass number	

Lesson 6—The Periodic Table

Goal: To learn what the periodic table of the elements is and how it organizes chemical information

WORDS TO KNOW

actinides	lanthanides
alkali metals	luster
alkaline earth metals	malleable
ductile	metalloids
families	metals
graphite	noble gases
groups	nonmetals
halogens	periodic table
heteronuclear diatomic molecule	periods
homonuclear diatomic molecule	transition metals
inner transition elements	

Lesson 7—Atoms, Molecules, Ions, and the Mole

Goal: To learn about ions, different chemical formulas, and how chemists count using the mole

WORDS TO KNOW

anions	empirical formula	molecular formula
Avogadro's number	ionic compound	single bonds
bonds	ions	structural formula
cations	molar mass	triple bond
double bond	mole	

Lesson 8—Periodic Trends

Goal: To learn how the properties of atoms vary across the periodic table

WORDS TO KNOW

atomic radius	ionic radius	valence electrons
effective nuclear charge, Z_{eff}	shielding	

Notes on Application Activities in Student Text

Activity	Skills Applied	Products
Finding the Density of an Irregular Solid	measuring mass, measuring volume, calculating density	density of sand
Comparing Atomic Radii	graphing data, accounting for trends (making inferences)	two graphs

Additional Activity Suggestion

- The hazards of asbestos are well documented. Have learners research asbestos and what elements (ions) are in its molecular formula. Ask them to research the damage that asbestos can do to the human body. You might direct learners to an Internet site such as the one run by the American Lung Association (<http://www.lungusa.org/air/envasbestos.html>). Lead a discussion about the major health problems associated with asbestos. Topics to consider could be the following: Can people exposed to asbestos in the workplace sue their employers for diseases they may have contracted? Are employers obligated to tell workers that there is asbestos in their work environment? What costs are associated with this problem?



Differentiation

- Pique learner interest in chemical activity with this simple demonstration. In photography, the film is usually coated with a gelatin emulsion containing tiny grains of some silver salt, usually Ag^+Br^- (an ionic compound). Put enough AgBr in a petri dish to cover the bottom of the dish. Place a colored paper clip in the center of the dish on top of the AgBr . (Use a colored paper clip instead of a silver clip for dramatic effect.) Place the dish in direct sunlight for about 30 minutes. The AgBr will change color from white to dark gray. Lift off the paper clip and a “photo” of it will appear in white against the gray AgBr . Explain that the light causes the Br^- to transfer electrons to Ag^+ , forming elemental Ag . Because the paper clip blocks the light, the electron exchange will not occur as quickly as it will to the AgBr exposed to light. This leaves an image of the paper clip that resembles a photo.