

## 1 FOCUS

### Objectives

- 1.3.1 **Describe** how Lavoisier transformed chemistry.
- 1.3.2 **Identify** three steps in the scientific method.
- 1.3.3 **Explain** why collaboration and communication are important in science.

### Guide for Reading

#### Build Vocabulary

**Word Forms** When discussing the two types of variables, explain that one meaning of *manipulate* is “to manage or control” and one meaning of *response* is “to answer or act in turn.”

#### Reading Strategy

**Use Prior Knowledge** Before students read the section, ask them what they know about the scientific method.

## 2 INSTRUCT

### Connecting to Your World

Have students read the opening paragraph and look at the photo. Ask, **What made Fleming different from other scientists who had seen this mold?** (Fleming recognized the importance of this discovery. He assumed that the mold had released a chemical that prevented the growth of bacteria.)

### Alchemy

#### Relate

Students who have read the Harry Potter books will be familiar with the name of one alchemist, Nicolas Flamel (1330–1414), who wrote a book about the philosopher’s stone. Alchemists believed that the philosopher’s stone could change base metals into gold.

### Guide for Reading



#### Key Concepts

- How did alchemy lay the groundwork for chemistry?
- How did Lavoisier help to transform chemistry?
- What are the steps in the scientific method?
- What role do collaboration and communication play in science?

#### Vocabulary

scientific method  
observation  
hypothesis  
experiment  
manipulated variable  
responding variable  
theory  
scientific law

#### Reading Strategy

**Building Vocabulary** After you read this section, explain the difference between a theory and a scientific law.



20 Chapter 1

### Connecting to Your World

In 1928, Alexander Fleming, a Scottish scientist, noticed that a bacteria he was studying did not grow in the presence of a yellow-green mold. Other scientists had made the same observation, but Fleming was the first to recognize its importance. He assumed that the mold had released a chemical that prevented the growth of the bacteria. That chemical was penicillin, which can kill a wide range of harmful bacteria. In 1945, Fleming shared a Nobel Prize for Medicine with Howard Florey and Ernst Chain, who led the team that isolated penicillin. In this section you will study the methods scientists use to solve problems.



### Alchemy

The word *chemistry* comes from alchemy. Long before there were chemists, alchemists were studying matter. Alchemy arose independently in many regions of the world. It was practiced in China and India as early as 400 B.C. In the eighth century, Arabs brought alchemy to Spain, from where it spread quickly to other parts of Europe.

Alchemy had a practical side and a mystical side. Practical alchemy focused on developing techniques for working with metals, glass, and dyes. Mystical alchemy focused on concepts like perfection. Because gold was seen as the perfect metal, alchemists were searching for a way to change other metals, such as lead, into gold. Although alchemists did not succeed in this quest, the work they did spurred the development of chemistry.

Alchemists developed the tools and techniques for working with chemicals. Alchemists developed processes for separating mixtures and purifying chemicals. They designed equipment that is still used today, including beakers, flasks, tongs, funnels, and the mortar and pestle in Figure 1.15. What they did not do was provide a logical set of explanations for the changes in matter that they observed. That task was left for chemists to accomplish.

**Figure 1.15** A bowl-shaped mortar and a club-shaped pestle are used to grind or crush materials such as herbs, spices, and paint pigments. The mortar and pestle in the photograph is made of porcelain, which is a hard material.

## Section Resources

### Print

- [Guided Reading and Study Workbook, Section 1.3](#)
- [Core Teaching Resources, Section 1.3 Review](#)
- [Transparencies, T5–T6](#)
- [Laboratory Manual, Lab 1](#)
- [Small-Scale Chemistry Laboratory Manual, Lab 1](#)

### Technology

- [Interactive Textbook with ChemASAP, Assessment 1.3](#)
- [Go Online, Section 1.3](#)

# Prentice Hall Scientific Learning System Teachers Desk Reference

**Prentice-Hall Staff**



## **Prentice Hall Scientific Learning System Teachers Desk Reference:**

Prentice Hall Scientific Learning System Prentice-Hall Staff,1994      **Prentice Hall Science** Anthea Maton,Jill D. Wright,Jean Hopkins,Susan Johnson,David Lahart,Maryanna Quon Warner,1994      *Matter* Prentice-Hall Staff,1994  
Matter, Building Block of the Universe ,1993      Resources for Teaching Middle School Science Smithsonian Institution,National Academy of Engineering,National Science Resources Center of the National Academy of Sciences,Institute of Medicine,1998-04-30 With age appropriate inquiry centered curriculum materials and sound teaching practices middle school science can capture the interest and energy of adolescent students and expand their understanding of the world around them Resources for Teaching Middle School Science developed by the National Science Resources Center NSRC is a valuable tool for identifying and selecting effective science curriculum materials that will engage students in grades 6 through 8 The volume describes more than 400 curriculum titles that are aligned with the National Science Education Standards This completely new guide follows on the success of Resources for Teaching Elementary School Science the first in the NSRC series of annotated guides to hands on inquiry centered curriculum materials and other resources for science teachers The curriculum materials in the new guide are grouped in five chapters by scientific area Physical Science Life Science Environmental Science Earth and Space Science and Multidisciplinary and Applied Science They are also grouped by type core materials supplementary units and science activity books Each annotation of curriculum material includes a recommended grade level a description of the activities involved and of what students can be expected to learn a list of accompanying materials a reading level and ordering information The curriculum materials included in this book were selected by panels of teachers and scientists using evaluation criteria developed for the guide The criteria reflect and incorporate goals and principles of the National Science Education Standards The annotations designate the specific content standards on which these curriculum pieces focus In addition to the curriculum chapters the guide contains six chapters of diverse resources that are directly relevant to middle school science Among these is a chapter on educational software and multimedia programs chapters on books about science and teaching directories and guides to science trade books and periodicals for teachers and students Another section features institutional resources One chapter lists about 600 science centers museums and zoos where teachers can take middle school students for interactive science experiences Another chapter describes nearly 140 professional associations and U S government agencies that offer resources and assistance Authoritative extensive and thoroughly indexed and the only guide of its kind Resources for Teaching Middle School Science will be the most used book on the shelf for science teachers school administrators teacher trainers science curriculum specialists advocates of hands on science teaching and concerned parents      **Electricity and Magnetism** ,1993      **Cells** ,1997      **Physical Science Teacher's Desk Reference** Prentice-Hall Staff,1993      **Prentice Hall Science** ,1993  
**Evolution** ,1994      **Motion, Forces** Prentice-Hall Staff,1994 Reviewed in The Textbook Letter 3 4 94      **Human**

**Biology and Health** ,1997      **Exploring Planet Earth** ,1994      *Parade of Life* PH Inc. Staff,1994      Heat Energy Anthea Maton,1993      **Parade of Life** ,1993      *Ecology* ,1994 Authorized teaching resource in Alberta for senior high science 14 24 1995 2004      *Books In Print 2004-2005* Ed Bowker Staff,Staff Bowker, Ed,2004      **Prentice Hall Exploring Life Science** Anthea Maton,1997      **Heredity** ,1993

## Reviewing **Prentice Hall Scientific Learning System Teachers Desk Reference**: Unlocking the Spellbinding Force of Linguistics

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### **Table of Contents Prentice Hall Scientific Learning System Teachers Desk Reference**

1. Understanding the eBook Prentice Hall Scientific Learning System Teachers Desk Reference
  - The Rise of Digital Reading Prentice Hall Scientific Learning System Teachers Desk Reference
  - Advantages of eBooks Over Traditional Books
2. Identifying Prentice Hall Scientific Learning System Teachers Desk Reference
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Prentice Hall Scientific Learning System Teachers Desk Reference
  - User-Friendly Interface
4. Exploring eBook Recommendations from Prentice Hall Scientific Learning System Teachers Desk Reference
  - Personalized Recommendations

- Prentice Hall Scientific Learning System Teachers Desk Reference User Reviews and Ratings
- Prentice Hall Scientific Learning System Teachers Desk Reference and Bestseller Lists
- 5. Accessing Prentice Hall Scientific Learning System Teachers Desk Reference Free and Paid eBooks
  - Prentice Hall Scientific Learning System Teachers Desk Reference Public Domain eBooks
  - Prentice Hall Scientific Learning System Teachers Desk Reference eBook Subscription Services
  - Prentice Hall Scientific Learning System Teachers Desk Reference Budget-Friendly Options
- 6. Navigating Prentice Hall Scientific Learning System Teachers Desk Reference eBook Formats
  - ePub, PDF, MOBI, and More
  - Prentice Hall Scientific Learning System Teachers Desk Reference Compatibility with Devices
  - Prentice Hall Scientific Learning System Teachers Desk Reference Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Prentice Hall Scientific Learning System Teachers Desk Reference
  - Highlighting and Note-Taking Prentice Hall Scientific Learning System Teachers Desk Reference
  - Interactive Elements Prentice Hall Scientific Learning System Teachers Desk Reference
- 8. Staying Engaged with Prentice Hall Scientific Learning System Teachers Desk Reference
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Prentice Hall Scientific Learning System Teachers Desk Reference
- 9. Balancing eBooks and Physical Books Prentice Hall Scientific Learning System Teachers Desk Reference
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Prentice Hall Scientific Learning System Teachers Desk Reference
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Prentice Hall Scientific Learning System Teachers Desk Reference
  - Setting Reading Goals Prentice Hall Scientific Learning System Teachers Desk Reference
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Prentice Hall Scientific Learning System Teachers Desk Reference
  - Fact-Checking eBook Content of Prentice Hall Scientific Learning System Teachers Desk Reference

- Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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