

Contemporary Chemistry

Teacher's Guide

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Applied Chemistry I

Lesson Plans

Plan 1

Instructional Objectives

1. Define *biology, chemistry, geology, physics*.
2. Define *controlled experiment, experiment, hypothesis, scientific law, scientific method, theory*.
3. Outline and explain the steps in the scientific method.

DO NOW

List at least ten things we have today that did not exist when your parents were your age.

Answers: Answers will vary. Some answers may include: VCRs, laptop computers, genetically engineered drugs, antilock brakes on cars, solar-powered calculators, breathable water-resistant fabrics, or compact disc (CD) players.

Motivation

How is science different from all other subjects studied in school? (Math was and continues to be invented by people. English (and other languages) were developed by people. Social Studies examine how people relate to each other. Science is the only subject that studies *natural* events.)

Aim

What is science?

Development

1. What are the branches of science?
2. How can we define each branch of science?
3. What is chemistry?
4. What are the branches of chemistry?
5. What career opportunities exist in chemistry? (See career table at the end of Chapter 1—CC, p. 23)

6. How do scientists, business executives, military leaders, governmental leaders, and others make decisions and solve problems?
7. What are the steps of the scientific method? (CC, Section 1-1)
8. Apply the steps to Pasteur's discovery of microbes.

Homework

Read: Introduction and Section 1-1 (pp. 3–6)

Write: Reading Power #1 & #2 (p. 18)

Mind Expanders #5 (p. 19)

The Scientific Method (p. 19)

Plan 2

Instructional Objectives

1. Assign each student to a work (lab) location and explain behavioral standards in the laboratory.
2. Achieve 100% on the Lab Safety Test administered the next day.

DO NOW

Outline and explain the steps in the scientific method or any other Instructional Objective from the previous lesson.

References: See p. 5 in CC for an outline of the scientific method. Biology, chemistry, geology, and physics are defined in the introduction on p. 3 of CC.

Motivation

A chemistry lab often has open flames, hot objects, glass, poisonous chemicals, acids, bases, and other hazards. The lab can be a dangerous place to work in if you violate lab safety rules.

Aim

How can I work safely in the lab?

Development

1. Show and demonstrate the use of the lab safety glasses, aprons, and gloves that are often used by chemists.
2. Elicit lab safety rules from the class. List them on the board. Have students copy the rules into their notebooks.
3. Assign laboratory work spaces to each student.
4. Distribute the first lab sheet. Discuss the purpose of the lab, safety concerns, and what students should look for in the lab.

Applied Chemistry II

Lesson Plans

Plan 1

NOTE: This lesson may require more than one period of instruction.

Instructional Objectives

1. Compare construction materials of ancient civilizations with those used in society today.
2. Define *cement, ceramics, clay, concrete, diatomaceous earth, limestone.*
3. Compare the chemical content of the earth, the human body, and the universe.
4. Explain how cement is made and used.
5. Compare cement, concrete, and reinforced concrete.
6. Explain present uses and predict future uses for ceramics.
7. List at least five careers in the construction industry by educational level. (See the Careers table, CC, p. 197)

DO NOW

List at least three materials used in the construction of modern buildings.

Reference: See Section 8-1 on pp. 182–183, and Table 8-1 (p. 182) in CC.

Motivation

Which construction materials used today were also used in ancient Egypt?

Aim

What is the chemistry of construction materials?

Development

1. What are construction materials made of? (Section 8-1)
2. How do the compositions of the earth, the universe, and the human body compare? (Table 8-2, CC, p. 183)
3. How is cement made? (Section 8-2)
4. What is needed for the setting of cement?

5. How are ceramics made? (Section 8-3)
6. List at least five careers in the construction industry by educational level. (See the Careers table, CC, p. 197.)

Homework

Read: Introduction and Sections 8-1, 8-2 and 8-3 (pp. 179-187)

Write: Reading Power #1-4 (pp. 192-193)

Mind Expanders #1-3 and 6 (pp. 193 and 194)

A list of at least five careers in the construction industry by educational level (Careers table, p. 197)

Plan 2

NOTE: This lesson may require more than one period of instruction.

Instructional Objectives

1. Define *glass, gypsum, plaster of paris*.
2. Explain how glass is made.
3. Distinguish between plaster of paris and gypsum.
4. Review lab safety rules.
5. Score 100% on the lab safety test.
6. Organize the lab.

DO NOW

Compare construction materials of ancient civilizations with those used in society today.

Reference: See the Introduction on pp. 179-182 in CC.

Motivation

Glass was made in ancient civilizations and continues in use today.

Aim

How is glass made? How is plaster made?

Development

1. How is glass made? (Section 8-4)
2. What kinds of glass are there?
3. How is plaster made? (Section 8-6)

Test 1 for Week 1

(Lessons 1-5)

A. DIRECTIONS: Choose the term from the list below that will correctly complete the following statements. (Some words may be used more than once.)

centigrade	length
chemistry	Louis Pasteur
experiment	scientific method
gram	theory
hypothesis	volume

1. The study of the materials that compose our universe is called _____.
2. The _____ is a systematic approach to decision making and problem solving.
3. There are 100 graduations between the freezing point and the boiling point of water in the _____ temperature scale.
4. The germ theory was developed by the chemist _____.
5. The _____ is a unit of mass in the metric system.
6. The liter is a unit of _____ in the metric system.
7. The unit of _____ in the metric system is the meter.
8. A preliminary theory that has not been tested is called a _____.
9. An idea, confirmed by an experiment, is a _____.
10. A scientific _____ is performed to confirm a hypothesis or a theory.



Test 1 for Week 1 *(continued)*

(Lessons 1-5)

B. Directions: Choose the phrase from column B that best describes the term in column A. Write the number of the phrase next to the term.

Column A	Column B
_____ experiment	1. a system for solving problems
_____ science	2. the first step in the scientific method
_____ germ theory	3. a tested hypothesis
_____ controlled experiment	4. a test of a theory or hypothesis
_____ scientific method	5. the study of the material universe
_____ chemistry	6. theory that certain bacteria sour wine
_____ Celsius	7. the metric unit of volume
_____ theory	8. a regulated test in which only one factor is changed
_____ definition of a problem	9. the metric temperature scale
_____ liter	10. the study of nature



Test 1 for Week 1

(Lessons 1-5)

DIRECTIONS: Circle the letter in front of the answer that best completes the statement.

- Construction materials can best be described as having changed
 - most between the Egyptian and Greek civilizations.
 - most between the Greek and Roman civilizations.
 - greatly between the Greek and Roman civilizations.
 - little between ancient and modern times.
- The most abundant elements on the surface of the earth are
 - silicon, oxygen, and aluminum.
 - calcium, silicon, and aluminum.
 - sodium, oxygen, and aluminum.
 - hydrogen, helium, and nitrogen.
- Glaze is applied to ceramics to make it
 - porous.
 - non-porous.
 - rough.
 - more sturdy.
- Plaster of paris needs
 - water to set and becomes granite.
 - air to set and becomes granite.
 - water to set and becomes gypsum.
 - air to set and becomes gypsum.
- Plaster of paris is prepared from
 - fired ceramics.
 - fired Na_2CO_3 .
 - fired limestone.
 - fired gypsum.
- Concrete is a mixture of
 - sand and lime.
 - sand and salt.
 - sand and limestone.
 - sand and cement.
- Cement is a fine powder formed by grinding and heating
 - clay and limestone.
 - clay and lime.
 - sand and limestone.
 - aluminum and clay.
- Mortar sets
 - in water only.
 - in air or under water.
 - in air only.
 - in all conditions.
- Glass is made from melting (fusing)
 - sand and gypsum.
 - sand and limestone.
 - sand and metallic oxides.
 - gypsum and limestone.
- The newest important use for glass today is in
 - construction.
 - telescope mirrors.
 - optical fibers.
 - see-through cooking pots.