Name _____ Date _____ Class _____

16 ELEMENTS OF CHEMISTRY

Unit I - Reading Assignments

1. _____ are the fundamental building blocks of everything around us.

16.1 CHEMISTRY: THE CENTRAL SCIENCE

This section discusses why chemistry is called the central science.

Reading Strategy

▶ **Using Prior Knowledge** Before you read, write your definition for the term. After you read, write the scientific definition and compare it to your original definition

Term	Your Definition	Scientific Definition
Chemistry		

2. Why is chemistry often described as the central science? _____

_____

Integrated Science—General Science: Research

This section discusses applied and basic research.

Unscramble the word and fill in the blank.

3. Research can be defined as any activity whose purpose is the _____ of new knowledge. (verydisco).

4. The two different kinds of research mentioned here are _____ and _____.

Unscramble the word and fill in the blank.

5. Most chemists are interested in _____ research. (pliedap).

6. The American Chemistry Council stresses the importance of manufacturers using chemistry wisely, so that waste products can be
   a. recycled.
   b. minimized.
   c. engineered into useful products.
   d. rendered environmentally safe.
   e. all of the above

16.2 THE SUBMICROSCOPIC WORLD

This section discusses atoms, molecules, and the phases of matter.

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Reading Strategy

▶ **Predicting** Before you read, predict the meanings of the vocabulary terms. After you read, revise your definitions if your predictions were incorrect.

Vocabulary Term	Before You Read	After You Read
Molecule		
Macroscopic		
Microscopic		
Submicroscopic		
Phase		

Unscramble the word and fill in the blank.

7. Atoms can link together to form _____. (culemoles)

8. What is the chemical symbol for water?
a. H_2O_2
b. HO
c. CO_2
d. H_2O

9. True or False: *Submicroscopic* refers to the realm of atoms and molecules. _____

10. What are the three phases of matter? _____

Unscramble the words and fill in the blanks.

11. When the molecules of an object are tightly bound together and cannot move around except to vibrate, that object is in its _____ phase. (dolis)

12. When the molecules of a material are loosely bound together, but can slip and slide by one another, that material is in its _____ phase. (dilqui)

13. When the molecules of a material are far apart and flying around at about 500 m/s and banging into one another, that material is in its _____ phase. (sag)

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16.3 CHANGE OF PHASE

This section discusses how a substance changes from one phase into another with the addition or removal of heat.

Reading Strategy

▶ **Monitoring Your Understanding** Preview the key concepts about change of phase. Then list two things you expect to learn in this section. After reading, state what you learned.

What I Expect to Learn	What I Learned

14. What must you do to a material to change its phase? _____

15. When a solid material melts, what would a chemist say was happening to it? _____

_____

16. What must you do to an object to change it from its solid phase to its gas phase? _____

17. When a solid changes into a liquid, we say that it _____. When that same liquid changes back into a solid, we say that it _____.

18. What are the terms we use for liquids and gases that change from one phase into the other? _____

_____

_____

19. When we heat water, say on the stove, it becomes hotter and hotter and then it begins to boil (evaporating very quickly). If it was fresh water and at sea level, what is the temperature?

_____

20. When you continue to heat the water, it boils even more vigorously. What does the thermometer say now? _____

21. Why? _____

_____

22. The amount of energy needed to change any substance from a solid to a liquid (or from a liquid to a solid) is called the _____.

23. The amount of energy needed to change any substance from a liquid to a gas (or from a gas to a liquid) is called the _____.

16.4 PHYSICAL AND CHEMICAL PROPERTIES

This section discusses chemical and physical properties and changes, chemical bonds, and chemical reactions.

Reading Strategy

▶ **Summarizing** After reading this section, summarize what you know about the topics. Then give some examples.

Topic	Example
Physical change:	
Chemical change:	

24. Substances can generally be identified by four physical properties. What are they? _____
_____

25. Name one factor that might change the physical characteristics of a sample of a substance.
_____

26. Freezing of water is considered to be a _____ _____, just as the melting of water is, because ice is still water.

27. What other characteristic of a sample of a substance might change as a result of a temperature change even though the substance did not change *phase*? _____

28. What term characterizes the ability of a substance to react with other kinds of substances?
_____

29. When methane gas reacts with oxygen, what happens? _____
_____

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30. When baking soda reacts with vinegar, what happens? _____

_____

31. A _____ _____ is the force of attraction that holds atoms together.

32. When you pass an electric current through water, what happens? _____

_____

_____

16.5 DETERMINING PHYSICAL AND CHEMICAL CHANGES

This section gives guidelines about determining whether a change is chemical or physical.

Reading Strategy

▶ **Comparing and Contrasting** As you read, complete the organizer to compare and contrast a physical change with a chemical change.

Physical Change	Chemical Change

Differences

Similarities

33. After a _____ change, the molecules are the same as when you started.

34. After a _____ change, the original molecules are destroyed and new ones take their place.

35. What can you do to determine whether an observed change in the appearance of an object is a *physical* or a *chemical* change? _____

_____

36. What happens to potassium chromate when you heat it? _____

_____

37. What happens to potassium chromate when you cool it? _____

38. Are the changes in potassium chromate chemical or physical? _____