

Name: \_\_\_\_\_

Homework was checked against the key with wrong answers corrected.

Parent Signature: \_\_\_\_\_

## Chapter 2: Matter and Change

Each numbered question is worth 1 point except as noted. Total possible = 36 points

### Section 2.1

1. Is every sample of matter a substance? Explain.
2. Contrast the characteristics of the three states of matter.
3. Which of the following are physical changes?
  - a. making caramel from sugar
  - b. carving a wooden figurine
  - c. freezing mercury
  - d. dissolving salt in water
4. Use Table 2.1 to answer the following questions.
  - a. Which of the liquids listed has the highest boiling point?
  - b. What two properties of sucrose distinguish it from sodium chloride?
  - c. What single property do neon, oxygen, and ethanol have in common?

### Section 2.2

5. What physical properties could be used to separate iron filings from salt?
6. Which of the following are homogeneous? Heterogeneous?
  - a. spaghetti sauce
  - b. glass
  - c. muddy water
  - d. cough syrup
  - e. mixture of nitrogen gas and helium gas
7. What is the difference between a heterogeneous and a homogeneous mixture?

8. Describe a procedure that could be used to separate a mixture consisting of sand and salt.
9. Classify each of the following as a substance or a mixture.
- |             |                                 |
|-------------|---------------------------------|
| a. silver   | b. alphabet soup                |
| c. textbook | d. table salt (sodium chloride) |
10. Describe in your own words the difference between a *pure substance* and a *mixture*.
11. Describe ways in which the various components of a mixture can be separated.
12. Explain the term *phase* as it relates to homogeneous and heterogeneous mixtures.

### Section 2.3

13. A clear liquid in an open container is allowed to evaporate. After three days, a solid residue is left. Was the original liquid an element, a compound, or a mixture? How do you know?
14. How can you distinguish between an *element* and a *compound*?
15. Write the chemical symbols for each of the following elements.
- |           |           |               |
|-----------|-----------|---------------|
| a. copper | b. oxygen | c. phosphorus |
| d. silver | e. sodium | f. helium     |
16. Name the chemical elements represented by the following symbols.
- |             |             |
|-------------|-------------|
| a. Sn _____ | b. Ca _____ |
| c. S _____  | d. Cd _____ |
| e. P _____  | f. Cl _____ |
17. Classify each of these samples of matter as an element, a compound, or a mixture.
- |                    |          |
|--------------------|----------|
| a. spaghetti sauce | b. glass |
|--------------------|----------|

- c. table sugar
- d. river water
- e. cough syrup
- f. nitrogen

18. What elements make up the pain reliever acetaminophen (chemical formula is  $C_8H_9O_2N$ )? Which element is present in the greatest proportion by number of atoms?

#### Section 2.4

19. a. State the difference between a physical change and a chemical change, and list three likely indications that a chemical change has occurred. Which indication is most suggestive of a chemical reaction? (2 pts.)

b. State the law of conservation of mass. How does the mass of reactants compare with the mass of products in a given reaction? (1 pt.)

20. Classify the following changes as physical or chemical.

- a. cookies are baked
- b. water boils
- c. salt dissolves in water
- d. a firefly emits light
- e. milk spoils
- f. a metal chair rusts

21. Consider the law of conservation of mass as you answer this problem. When ammonium nitrate ( $NH_4NO_3$ ) breaks down explosively, it forms nitrogen gas ( $N_2$ ), oxygen gas ( $O_2$ ), and water ( $H_2O$ ). When 40 grams of ammonium nitrate explode, 14 grams of nitrogen gas and 8 grams of oxygen gas are formed. How many grams of water are formed?

22. State several physical or chemical properties that could be used to distinguish between each of the following pairs of substances and mixtures. (2 pts.)

- a. gasoline and water
- b. copper and silver

- c. water and a saltwater solution
- d. aluminum and steel

23. Hydrogen and oxygen react chemically to form water. How much water would be formed if 14.8 grams of hydrogen reacted with 38.4 grams of oxygen?

### Chapter 2 Review

29. Use Table 2.1 to identify four substances that undergo a physical change if the temperature is decreased from 50 °C to -50 °C. Describe the nature of the physical change. 2.1

33. Name the elements found in each of the following compounds. 2.3

- a. ammonium chloride ( $\text{NH}_4\text{Cl}$ )
- b. potassium permanganate ( $\text{KMnO}_4$ )
- c. isopropyl alcohol ( $\text{C}_3\text{H}_7\text{OH}$ )
- d. calcium iodide ( $\text{CaI}_2$ )

38. Devise a way to separate sand from a mixture of charcoal, sand, sugar, and water.

40. Use Table 2.1 to answer each question.

- a. Which property most easily distinguishes sulfur from the other solid substances?
- b. How many of these substances are elements?
- c. Which compound has the highest boiling point?

d. The solids are gradually heated. Which one will melt first?

43. How do you know that each of these is a chemical change?

a. food spoils

b. a foaming antacid tablet fizzes in water

c. a ring of scum forms around your bathtub

d. iron rusts

e. a firecracker explodes

45. Compare the relationships among individual particles in the three states of matter.

50. Each day of your life you encounter some chemical changes that are helpful and some that are harmful. Cite three examples of each. For each example, list the indications that identified the change as chemical. [You will be naming a total of six examples.] (4 pts.)