

CHAPTER 3

STUDY GUIDE FOR CONTENT MASTERY

Section 3.4 Elements and Compounds

In your textbook, read about elements and compounds.

Circle the letter of the choice that best completes the statement or answers the question.

- A substance that cannot be separated into simpler substances by physical or chemical means is a(n)
 - compound.
 - mixture.
 - element.
 - period.
- A chemical combination of two or more different elements is a(n)
 - solution.
 - compound.
 - element.
 - period.
- Which of the following is an example of an element?
 - water
 - air
 - sugar
 - oxygen
- Which of the following is an example of a compound?
 - gold
 - silver
 - aspirin
 - copper
- What are the horizontal rows in the periodic table called?
 - block elements
 - groups or families
 - grids
 - periods
- What are the vertical columns in the periodic table called?
 - block elements
 - groups or families
 - grids
 - periods

Label each substance as either an *element* or a *compound*.

element	7. silicon	element	10. nickel
compound	8. sodium chloride	compound	11. ice
element	9. francium		
Write the symbol for each element. Use the periodic table on pages 72–73 in your textbook if you need help.			
Ne	12. neon	Ti	15. titanium
Ca	13. calcium	F	16. fluorine
Fe	14. iron		

In your textbook, read about the law of definite proportions.

Use the law of definite proportions and the equation below to answer the questions.

The law of definite proportions states that regardless of the amount, a compound is always composed of the same elements in the same proportion by mass.

$$\text{Mass percentage of an element (\%)} = \frac{\text{mass of element}}{\text{mass of compound}} \times 100\%$$

- A 20.0-g sample of sucrose contains 8.4 g of carbon. What is the mass percentage of carbon in sucrose? Show your work.

$$8.4 \text{ g carbon} / 20.0 \text{ g sucrose} \times 100\% = 42\% \text{ carbon}$$

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Section 3.4 continued

- Sucrose is 51.30% oxygen. How many grams of oxygen are in 20.0 g of sucrose? Show your work.

$$51.30\% \text{ oxygen} = \text{Mass}_{\text{oxygen}} / 20.0 \text{ g sucrose} \times 100\%$$

$$51.30\% \text{ oxygen} \times 20.0 \text{ g sucrose} / 100\% = \text{Mass}_{\text{oxygen}} = 10.3 \text{ g}$$

- A 2-g sample of sucrose is 6.50% hydrogen. What is the mass percentage of hydrogen in 300 g of sucrose? Explain your reasoning.

$$6.50\%; \text{ because the mass percentage is consistent regardless of the amount of sucrose}$$

- Two compound samples are found to have the same mass percentages of the same elements. What can you conclude about the two samples?

They are the same compound.

In your textbook, read about the law of multiple proportions.

Use the law of multiple proportions to answer the questions and complete the table below.

The law of multiple proportions states that if the elements X and Y form two compounds, the different masses of Y that combine with a fixed mass of X can be expressed as a ratio of small whole numbers.

- Two compound samples are composed of the same elements, but in different proportions. What can you conclude about the two samples?

They are not the same compound.

For each compound in the table, fill in the ratio of the mass of oxygen to the mass of hydrogen.

Compound	Mass of Oxygen	Mass of Hydrogen	Mass O/Mass H
H ₂ O	16 g	2 g	22.8 g O/1 g H
H ₂ O ₂	32 g	2 g	23.16 g O/1 g H

- Write a brief statement comparing the two mass ratios from the table.

The mass ratio of oxygen to hydrogen in H₂O₂ is two times the mass ratio of oxygen to hydrogen in H₂O. This follows the law of multiple proportions.

- Are H₂O and H₂O₂ the same compound? Explain your answer.

No; they have different proportions of hydrogen and oxygen.