

Chemistry – Unit 4 Worksheet 3

Use the following information about the masses of elements in each pair of compounds to help you suggest formulas that account for these ratios.

1. Compounds of carbon and oxygen

Compound A: 57.1 g O / 42.9 g C

Compound B: 72.7 g O and 27.3 C

- Determine the value of the ratio $\frac{\text{mass O}}{\text{mass C}}$ in each compound. A ____ B ____
- How does the mass ratio for compound B compare to that in compound A?
- Express these ratios as improper fractions.
- For each hypothesis, sketch particle diagrams for the compounds of A and B that account for these mass ratios. Write the formula for the compound in each diagram.

Hypothesis 1	Hypothesis 2
Atoms of C and O have the same mass	Atoms of O are heavier than C atoms by the ratio in compound A.
A	A
B	B

2. Compounds of copper and oxygen

Compound A: 79.9 g Cu / 20.1 g O

Compound B: 88.8 g Cu / 11.2 g O

- Determine the value of the ratio $\frac{\text{mass Cu}}{\text{mass O}}$ in each compound. A ____ B ____
- How does the mass ratio for compound B compare to that in compound A?
- Express these ratios as improper fractions.
- For each hypothesis, sketch particle diagrams for the compounds of A and B that account for these mass ratios. Write the formula for the compound in each diagram.

Hypothesis 1	Hypothesis 2
Atoms of Cu and O have the same mass	Cu atoms are heavier than O atoms by the ratio in compound A.
A	A
B	B

Which hypothesis seems more reasonable to you? Justify your answer.

Use the hypothesis you have chosen to suggest formulas for the following pairs of compounds.

3. Compounds of copper and chlorine

Compound A: 35.9 g of Cl / 64.1 g of Cu

Compound B: 52.8 g of Cl / 47.2 g Cu

- Determine the value of the ratio $\frac{\text{mass Cl}}{\text{mass Cu}}$ in each compound. A ____ B ____
- How does the mass ratio for compound B compare to that in compound A?
- What are the simplest formulas for compounds A and B? Explain your reasoning.

4. Compounds of iron and chlorine (be careful!)

Compound A: 56.0 g of Cl / 44.0 g of Fe

Compound B: 65.6 g of Cl / 34.4 g of Fe

- Determine the value of the ratio $\frac{\text{mass Cl}}{\text{mass Fe}}$ in each compound. A ____ B ____
- The ratios you determined in step (a) give the mass of Cl that combines with 1 g of Fe in each compound. To determine how the mass of Cl in compound B compares to the mass of Cl in compound A for the same amount of Fe, divide these ratios and express the answer as an improper fraction. What does this fraction tell you about the *number* of Cl atoms in each of the two compounds?
- What would be the formulas of the two compounds, assuming that each compound contains one atom of Fe?