

Matter—Properties and Changes

- An 18-g sample of element A combines completely with a 4-g sample of element B to form the compound AB. What is the mass of the compound formed?
- A substance breaks down into three component elements when it is heated. The mass of each component element is listed in the table below. What was the mass of the substance before it was heated?
- During a chemical reaction, 4.032 g of hydrogen combined with oxygen to form 36.032 g of water. How many grams of oxygen reacted?
- Nitrogen and oxygen combine to form different compounds, as shown below.

Component	Mass (g)
A	39.10
B	54.94
C	64.00

Compound	Chemical Formula	Mass N/1 g O
Nitric oxide	NO	1.76 g
Nitrogen dioxide	NO ₂	0.88 g
Nitrous oxide	NO ₄	0.44 g

- Silver iodide powder has been used as an anti-septic and as an agent to seed clouds for rain. Silver iodide is 45.9% silver by mass. If you separate a 50-g sample of silver iodide into its elements, silver and iodine, how much silver would you have?
- If 5 g of element A combines with 16 g of element B to form compound AB, how many grams of B are needed to form compound AB₂? How many grams of B are needed to form AB₃?
- During a chemical reaction, 2.445 g of carbon reacts with 3.257 g of oxygen to form carbon monoxide gas. How many grams of carbon monoxide are formed in this reaction?
- Ibuprofen has the chemical formula C₁₃H₁₈O₂. It is 75.69% carbon, 8.80% hydrogen, and 15.51% oxygen. How many mg of carbon does a 200-mg tablet of ibuprofen contain?
- What is the ratio of the masses of nitrogen in each of the following?
 $\text{NO}_2/\text{NO}_4 = \underline{\hspace{2cm}}$
 $\text{NO}/\text{NO}_4 = \underline{\hspace{2cm}}$
 $\text{NO}/\text{NO}_2 = \underline{\hspace{2cm}}$
- Carbon and oxygen combine to form carbon monoxide (CO) and carbon dioxide (CO₂). The masses of oxygen that combine with 12 g of carbon to form these two compounds are 16 g and 32 g, respectively. What is the ratio of the masses of oxygen in CO₂/CO?
- Phosphorus and chlorine combine to form two different compounds. In one compound, 3.88 g of phosphorus combines with 13.28 g of chlorine. In the other compound, 1.32 g of phosphorus combines with 7.56 g of chlorine. Do these data support the law of multiple proportions? Show your work.

11. Fluorine and xenon combine to form two different compounds. In one compound, 0.853 g of fluorine combines with 1.472 g of xenon. In the other compound, 0.624 g of fluorine combines with 2.16 g of xenon. Do these data support the law of multiple proportions? Show your work.
12. Ferric chloride is 34.4% iron and 65.6% chlorine by mass. A chemist analyzes three compounds that contain iron and chlorine. Her results are summarized in the data table below. Which of these compounds is likely to be ferric chloride? Explain your answer.

Compound	Mass of the Sample (g)	Mass of Fe (g)	Mass of Cl (g)
I	25	9.3	15.7
II	25	8.6	16.4
III	27	9.3	17.7

13. The chemical formula for baking soda is NaHCO_3 . A 168.02-g sample of baking soda contains 45.98 g of sodium, 2.02 g of hydrogen, 24.02 g of carbon, and 96 g of oxygen. What is the mass percentage of each element in baking soda?
14. The chemical formula for chalk is CaCO_3 . A 100-g sample of chalk contains 40 g of calcium, 12 g of carbon, and 48 g of oxygen. What is the mass percentage of each element in chalk? What would be the mass of calcium in 200 g of chalk?
15. A 17-g sample of ammonia, NH_3 , contains 3 g of hydrogen. What percentage of ammonia is hydrogen? How many grams of nitrogen does the sample contain?