

## 10-2 Practice Problems

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- Find the mass of 0.89 mol of  $\text{CaCl}_2$ .
- A bottle of  $\text{PbSO}_4$  contains 158.1 g of the compound. How many moles of  $\text{PbSO}_4$  are in the bottle?
- Find the mass of 1.112 mol of HF.
- Determine the number of moles of  $\text{C}_5\text{H}_{12}$  that are in 362.8 g of the compound.
- Find the mass of 0.159 mol of  $\text{SiO}_2$ .
- You are given 12.35 g of  $\text{C}_4\text{H}_8\text{O}_2$ . How many moles of the compound do you have?
- Find the mass of 3.66 mol of  $\text{N}_2$ .
- A bottle of  $\text{KMnO}_4$  contains 66.38 g of the compound. How many moles of  $\text{KMnO}_4$  does it contain?
- Determine the number of atoms that are in 0.58 mol of Se.
- How many moles of barium nitrate ( $\text{BaNO}_3$ ) contain  $6.80 \times 10^{24}$  formula units?
- Determine the number of atoms that are in 1.25 mol of  $\text{O}_2$ .
- How many moles of magnesium bromide ( $\text{MgBr}_2$ ) contain  $5.38 \times 10^{24}$  formula units?
- Determine the number of formula units that are in 0.688 mol of  $\text{AgNO}_3$ .
- How many moles of ethane ( $\text{C}_2\text{H}_6$ ) contain  $8.46 \times 10^{24}$  formula units?
- Determine the number of formula units that are in 1.48 mol of NaF.
- How many formula units are in 3.5 g of NaOH?

## 10-2 Practice Problems (continued)

17. If you burned  $6.10 \times 10^{24}$  molecules of ethane ( $C_2H_6$ ), what mass of ethane did you burn?
18. How many formula units are in 5.1 g of  $TiO_2$ ?
19. What is the mass of  $3.62 \times 10^{24}$  molecules of methanol ( $CH_3OH$ )?
20. How many formula units are in 1.4 g of  $PbCl_2$ ?
21. Determine the mass of  $2.94 \times 10^{24}$  molecules of decane ( $C_{10}H_{22}$ ).
22. How many formula units are in 5.6 g of  $H_2S$ ?
23. A container with a volume of 893 L contains how many moles of air at STP?
24. A chemical reaction produces 0.37 mol of  $N_2$  gas. What volume will that gas occupy at STP?
25. A canister with a volume of 694 L contains how many moles of oxygen at STP?
26. A chemical reaction produces 13.8 mol of CO gas. What volume will that gas occupy at STP?
27. A tube with a volume of 3.68 L contains how many moles of neon gas at STP?
28. A chemical reaction produces 0.884 mol of  $H_2S$  gas. What volume will that gas occupy at STP?
29. A container with a volume of 101 L contains how many moles of argon gas at STP?
30. A chemical reaction produces 138 mol of HBr gas. What volume will that gas occupy at STP?

## 10-3 Practice Problems

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1. Find the percentage composition of a compound that contains 1.94 g of carbon, 0.48 g of hydrogen, and 2.58 g of sulfur in a 5.00-g sample of the compound.
2. A sample of an unknown compound with a mass of 0.847 g has the following composition: 50.51 percent fluorine and 49.49 percent iron. When this compound is decomposed into its elements, what mass of each element would be recovered?
3. Find the percentage composition of a compound that contains 2.63 g of carbon, 0.370 g of hydrogen, and 0.580 g of oxygen in a 3.58-g sample of the compound.
4. A sample of an unknown compound with a mass of 2.876 g has the following composition: 66.07 percent carbon, 6.71 percent hydrogen, 4.06 percent nitrogen, and 23.16 percent oxygen. What is the mass of each element in this compound?
5. Find the percentage composition of a compound that contains 2.7369 g of chlorine, 0.4116 g of oxygen, and 0.7971 g of phosphorus in a 3.9460-g sample of the compound.
6. Find the percentage composition of a compound that contains 1.51 g of chromium, 1.13 g of potassium, and 1.62 g of oxygen in a 4.26-g sample of the compound.
7. A sample of a compound that has a mass of 0.432 g is analyzed. The sample is found to be made up of oxygen and fluorine only. Given that the sample contains 0.128 g of oxygen, calculate the percentage composition of the compound.
8. What is the percentage composition of a carbon-oxygen compound, given that a 95.2-g sample of the compound contains 40.8 g of carbon and 54.4 g of oxygen?
9. What is the percentage composition of a sulfur-chlorine compound, given that a 30.9-g sample of the compound contains 9.63 g of sulfur and 21.3 g of chlorine?
10. Determine the empirical formula of a compound containing 2.644 g of gold and 0.476 g of chlorine.
11. Determine the empirical formula of a compound containing 0.928 g of gallium and 0.412 g of phosphorus.
12. Determine the empirical formula of a compound containing 1.723 g of carbon, 0.289 g of hydrogen, and 0.459 g of oxygen.

**10-3 Practice Problems (continued)**

13. Find the empirical formula of a compound, given that the compound is found to be 47.9 percent zinc and 52.1 percent chlorine by mass.
14. Find the empirical formula of a compound, given that a 48.5-g sample of the compound contains 1.75 g of carbon and 46.75 g of bromine.
15. Determine the empirical formula of a compound containing 20.23 percent aluminum and 79.77 percent chlorine.
16. Determine the empirical formula of a compound containing 24.74 percent potassium, 34.76 percent manganese, and 40.50 percent oxygen.
17. Determine the empirical formula of a compound containing 4.288 g of carbon and 5.712 g of oxygen.
18. Determine the empirical formula of a compound containing 2.16 g of aluminum, 3.85 g of sulfur, and 7.68 g of oxygen.
19. Determine the empirical formula of a compound containing 3.611 g of calcium and 6.389 g of chlorine.
20. Find the molecular formula of a compound that contains 42.56 g of palladium and 0.80 g of hydrogen. The molar mass of the compound is 216.8 g/mol.
21. Octane, a compound of hydrogen and carbon, has a molar mass of 114.26 g/mol. If one mole of the compound contains 18.17 g of hydrogen, what is its molecular formula?
22. Find the molecular formula of a compound that contains 30.45 percent nitrogen and 69.55 percent oxygen. The molar mass of the compound is 92.02 g/mol.
23. Find the molecular formula of a compound, given that a 212.1-g sample of the compound contains 42.4 g of hydrogen and 169.7 g of carbon and the molar mass is 30.0 g/mol.
24. A compound is known to have a molar mass of 391.5 g/mol. Find the molecular formula of the compound, given the results of an analysis of a 310.8-g sample that revealed that the sample contains only boron and iodine. The mass of the iodine in the sample is found to be 302.2 g.
25. Find the molecular formula of a compound that contains 56.36 g of oxygen and 43.64 g of phosphorus. The molar mass of the compound is 283.9 g/mol.