# Mole Review

Chemistry

1. Calculate the number of moles in each of the following.
   a) 125 mL of hydrogen gas at STP
   b) $1.26 \times 10^{24}$ molecules of carbon dioxide
   c) 15.8 mL of sulfur trioxide at STP
   d) 2.65 g of copper(II) sulfate pentahydrate
   e) 12.6 g water
   f) 12.6 g sodium chloride
   g) $2.86 \times 10^{-3}$ g scandium acetate
   h) $4.57 \times 10^{17}$ atoms platinum

2. Calculate the mass of each of the following.
   a) $1.95 \times 10^{22}$ molecules of sucrose, $C_{12}H_{22}O_{11}$
   b) 2.50 L of propane, $C_3H_8$, at STP
   c) 0.780 mol $Ca(CN)_2$
   d) $9.57 \times 10^{17}$ atoms platinum
   e) 36.5 mL of chlorine at STP
   f) $5.68 \times 10^{27}$ molecules zinc nitrate
   g) 35.7 L of ozone ($O_3$)
   h) 0.145 mol cupric sulfate pentahydrate

3. Determine the number of atoms in each of the following.
   a) 1 molecule of $C_{17}H_{19}NO_3$
   b) 2.85 mol of Ag
   c) 0.875 L of carbon dioxide at STP
   d) 17.0 g of copper(II) sulfate pentahydrate
   e) 12.9 g of $CaCO_3$
   f) 12.9 g of $Fe(NO_3)_3$
   g) $2.86 \times 10^{-3}$ g scandium acetate
   h) 15.7 L of ozone ($O_3$)

4. Determine the volume of the following gases at STP.
   a) 12.5 g of carbon dioxide
   b) 2.15 mol of propane ($C_3H_8$)
   c) $9.57 \times 10^{17}$ atoms argon
   d) 345 g of krypton
   e) $6.88 \times 10^{20}$ atoms of helium
   f) 125 g of sulfur trioxide
   g) $1.95 \times 10^{22}$ molecules of carbon monoxide
   h) $5.68 \times 10^{27}$ atoms xenon

5. a) What volume of 0.125 M $CaCl_2$ can be made from 15.0 g?
   b) Determine the volume of 4.50 M silver nitrate that can be made from 100.0 g of silver nitrate.
   c) What is the volume of a 0.875 mol/L solution that contains 18.6 g of ferrous sulfate heptahydrate?

6. a) What is the molarity of 325 g of $NaHCO_3$ dissolved in 2500.0 mL of solution?
   b) Determine the concentration of 56.0 g of cadmium nitrate in 400.0 mL of solution.
   c) What is the molarity of 167 g of ammonium sulfate in 950.0 mL of solution?

7. a) What volume of 14.0 M nitric acid would be required to make 750.0 mL of 0.100 M nitric acid?
   b) What volume of 18.0 M sulphuric acid is required to prepare 2.50 L of 0.200 M sulphuric acid?
   c) What is the concentration when 20.0 mL of 12.0 M hydrochloric acid is diluted to a final volume of 1.00 L?

8. What is the molarity of a solution that contains 36.1 g of $MgCl_2$ in 895 mL of solution.

9. You need to prepare 2.50 L of a 0.125 M solution of hydrochloric acid, but the only solution available is 12.0 M. What volume of the 12.0 M solution must be diluted?

10. What mass of sodium sulfate is required to prepare 750.0 mL of a 0.275 M solution?

11. 225.0 mL of 0.500 M nitric acid is added to 100.0 mL of 2.00 M nitric acid. What is the molarity of the mixture?

12. Two solutions are mixed together. The first solution is 250.0 mL of 0.450 M hydrochloric acid. The second solution consists of 600.0 mL of 2.800 M hydrochloric acid. What is the concentration of the solution that is obtained when the two are mixed together?

13. Determine the percentage composition of each element in gallium nitrate.