

**10****CHEMICAL QUANTITIES****Practice Problems**

*In your notebook, solve the following problems.*

**SECTION 10.1 THE MOLE: A MEASUREMENT OF MATTER**

1. What is the molar mass of sucrose ( $C_{12}H_{22}O_{11}$ )?
2. What is the molar mass of each of the following compounds?
  - a. phosphorus pentachloride ( $PCl_5$ )
  - b. uranium hexafluoride ( $UF_6$ )
3. Calculate the molar mass of each of the following ionic compounds:
  - a.  $KMnO_4$
  - b.  $Ca_3(PO_4)_2$
4. How many moles is  $3.52 \times 10^{24}$  molecules of water?
5. How many atoms of zinc are in 0.60 mol of zinc?
6. What is the mass of 1.00 mol of oxygen ( $O_2$ )?

**SECTION 10.2 MOLE–MASS AND MOLE–VOLUME RELATIONSHIPS**

1. What is the molar mass of each of the following compounds?
  - a.  $C_6H_{12}O_6$
  - b.  $NaHCO_3$
  - c.  $C_7H_{12}$
  - d.  $KNH_4SO_4$
2. Calculate the mass in grams of each of the following:
  - a. 8.0 mol lead oxide ( $PbO$ )
  - b. 0.75 mol hydrogen sulfide ( $H_2S$ )
  - c. 0.00100 mol silicon tetrahydride ( $SiH_4$ )
  - d.  $1.50 \times 10^{-2}$  mol molecular oxygen ( $O_2$ )
  - e. 2.30 mol ethylene glycol ( $C_2H_6O_2$ )
3. How many grams are in 1.73 mol of dinitrogen pentoxide ( $N_2O_5$ )?
4. How many grams are in 0.658 mol of calcium phosphate [ $Ca_3(PO_4)_2$ ]?
5. Calculate the number of moles in each of the following:
  - a. 0.50 g sodium bromide ( $NaBr$ )
  - b. 13.5 g magnesium nitrate [ $Mg(NO_3)_2$ ]
  - c. 1.02 g magnesium chloride ( $MgCl_2$ )
  - d. 0.00100 g monochloromethane ( $CH_3Cl$ )
  - e.  $1.50 \times 10^{-3}$  g propylene glycol [ $C_3H_6(OH)_2$ ]
6. A chemist plans to use 435.0 grams of ammonium nitrate ( $NH_4NO_3$ ) in a reaction. How many moles of the compound is this?
7. A solution is to be prepared in a laboratory. The solution requires 0.0465 mol of quinine ( $C_{20}H_{24}N_2O_2$ ). What mass, in grams, should the laboratory technician obtain in order to make the solution?

8. What is the volume at STP of 2.66 mol of methane ( $\text{CH}_4$ ) gas?
9. How many moles is 135 L of ammonia ( $\text{NH}_3$ ) gas at STP?

### 10.3 PERCENT COMPOSITION AND CHEMICAL FORMULAS

1. A sample of a compound analyzed in a chemistry laboratory consists of 5.34 g of carbon, 0.42 g of hydrogen, and 47.08 g of chlorine. What is the percent composition of this compound?
2. Find the percent composition of a compound containing tin and chlorine if 18.35 g of the compound contains 5.74 g of tin.
3. If 3.907 g of carbon combines completely with 0.874 g of hydrogen to form a compound, what is the percent composition of this compound?
4. From the formula for calcium acetate,  $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ , calculate the mass of carbon that can be obtained from 65.3 g of the compound.
5. How many grams of aluminum are in 25.0 g of aluminum oxide ( $\text{Al}_2\text{O}_3$ )?
6. How many grams of iron are in 21.6 g of iron(III) oxide ( $\text{Fe}_2\text{O}_3$ )?