

Worksheet: The Mole

Key

1. Calculate each of the following:

a. Number of Ag atoms in 0.200 mole of Ag

$$0.200 \text{ mol Ag} \times \frac{6.02 \times 10^{23} \text{ atoms Ag}}{1 \text{ mol Ag}} = \boxed{1.20 \times 10^{23} \text{ atoms Ag}}$$

b. Number of C₃H₈O molecules in 0.750 mole of C₃H₈O

$$0.750 \text{ mol C}_3\text{H}_8\text{O} \times \frac{6.02 \times 10^{23} \text{ molecules C}_3\text{H}_8\text{O}}{1 \text{ mol C}_3\text{H}_8\text{O}} = \boxed{4.52 \times 10^{23} \text{ molecules C}_3\text{H}_8\text{O}}$$

c. Moles of Au in 2.88×10^{23} atoms of Au

$$2.88 \times 10^{23} \text{ atoms Au} \times \frac{1 \text{ mol Au}}{6.02 \times 10^{23} \text{ atoms Au}} = \boxed{0.478 \text{ mol Au}}$$

2. Calculate each of the following:

a. Number of SO₂ molecules in 1.28 moles SO₂

$$1.28 \text{ mol SO}_2 \times \frac{6.02 \times 10^{23} \text{ molecules SO}_2}{1 \text{ mol SO}_2} = \boxed{7.71 \times 10^{23} \text{ molecules SO}_2}$$

b. Moles of Fe in 5.22×10^{22} atoms of Fe

$$5.22 \times 10^{22} \text{ atoms Fe} \times \frac{1 \text{ mol Fe}}{6.02 \times 10^{23} \text{ atoms Fe}} = \boxed{0.0867 \text{ mol Fe}}$$

c. Moles of C₂H₅OH in 8.50×10^{24} molecules of C₂H₅OH

$$8.50 \times 10^{24} \text{ molecules C}_2\text{H}_5\text{OH} \times \frac{1 \text{ mol C}_2\text{H}_5\text{OH}}{6.02 \times 10^{23} \text{ molecules C}_2\text{H}_5\text{OH}} = \boxed{14.1 \text{ mol C}_2\text{H}_5\text{OH}}$$

3. A mole of H₂O and a mole of O₂:

- have the same mass
- contain one molecule each
- have a mass of 1 g each
- ☒ contain the same number of molecules

4. One molecule of sulfur contains 8 sulfur atoms. Then one mole of sulfur molecules will contain:

- a. 8g of sulfur
- b. 8 moles of sulfur atoms
- c. 6.02×10^{23} sulfur atoms
- d. 8 sulfur atoms

5. How many moles of oxygen atoms are there in 2 moles of KNO_3 ?

$$2 \text{ mol } \cancel{\text{KNO}_3} \times \frac{3 \text{ mol O}}{1 \text{ mol } \cancel{\text{KNO}_3}} = \boxed{6 \text{ mol O}}$$

6. How many nitrogen atoms are in 3.7 moles $(\text{NH}_4)_2\text{SO}_4$?

$$3.7 \text{ mol } \cancel{(\text{NH}_4)_2\text{SO}_4} \times \frac{2 \text{ mol } \cancel{\text{N}_2}}{1 \text{ mol } \cancel{(\text{NH}_4)_2\text{SO}_4}} \times \frac{6.02 \times 10^{23} \text{ atoms N}}{1 \text{ mol } \cancel{\text{N}}} =$$

$$\boxed{4.5 \times 10^{24} \text{ atoms N}}$$