

# CHAPTER 10 The Mole

## Section 1 Measuring Matter

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### Practice Problems

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1. Zinc (Zn) is used to form a corrosion-inhibiting surface on galvanized steel. Determine the number of Zn atoms in 2.50 mol of Zn.

$$2.50 \text{ mol Zn} \times \frac{6.02 \times 10^{23} \text{ atoms Zn}}{1 \text{ mol Zn}} \\ = 1.51 \times 10^{24} \text{ atoms of Zn}$$

2. Calculate the number of molecules in 11.5 mol of water (H<sub>2</sub>O).

$$11.5 \text{ mol H}_2\text{O} \times \frac{6.02 \times 10^{23} \text{ molecules H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \\ = 6.92 \times 10^{24} \text{ molecules H}_2\text{O}$$

3. Silver nitrate (AgNO<sub>3</sub>) is used to make several different silver halides used in photographic films. How many formula units of AgNO<sub>3</sub> are there in 3.25 mol AgNO<sub>3</sub>?

$$3.25 \text{ mol AgNO}_3 \times \frac{6.02 \times 10^{23} \text{ formula units AgNO}_3}{1 \text{ mol AgNO}_3} \\ = 1.96 \times 10^{24} \text{ formula units AgNO}_3$$

4. **Challenge** Calculate the number of oxygen atoms in 5.00 mol of oxygen molecules. Oxygen is a diatomic molecule, O<sub>2</sub>.

$$5.00 \text{ mol O}_2 \times \frac{6.02 \times 10^{23} \text{ molecules O}_2}{1 \text{ mol O}_2}$$

$$\times \frac{2 \text{ O atoms}}{\text{molecule O}_2} = 6.02 \cdot 10^{24} \text{ atoms O}$$

5. How many moles contain each of the following?
- a.  $5.75 \times 10^{24}$  atoms Al

$$5.75 \times 10^{24} \text{ atoms Al} \times \frac{1 \text{ mol Al}}{6.02 \times 10^{23} \text{ atoms Al}} \\ = 9.55 \text{ mol Al}$$

- b.  $2.50 \times 10^{23}$  atoms Fe

$$2.50 \times 10^{23} \text{ atoms Fe} \times \frac{1 \text{ mol Fe}}{6.02 \times 10^{23} \text{ atoms Fe}} \\ = 4.15 \times 10^{-1} \text{ mol Fe}$$

6. **Challenge** Identify the representative particle for each formula and convert the given number of representative particles to moles.

- a.  $3.75 \times 10^{24}$  CO<sub>2</sub>

The representative particle is a molecule.

$$3.75 \times 10^{24} \text{ molecules CO}_2 \\ \times \frac{1 \text{ mol CO}_2}{6.02 \times 10^{23} \text{ molecules CO}_2} = 6.23 \text{ mol CO}_2$$

- b.  $3.58 \times 10^{23}$  ZnCl<sub>2</sub>

The representative particle is a formula unit.

$$3.58 \times 10^{23} \text{ formula units ZnCl}_2 \\ \times \frac{1 \text{ mol ZnCl}_2}{6.02 \times 10^{23} \text{ formula units ZnCl}_2} \\ = 0.595 \text{ mol ZnCl}_2$$

## Section 1 Review

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7. **Explain** why chemists use the mole.

Chemists use the mole because it is a convenient way of knowing how many representative particles are in a sample.

8. **State** the mathematical relationship between Avogadro's number and 1 mol.

One mole contains Avogadro's number ( $6.02 \times 10^{23}$ ) of representative particles.

# Chapter 10 Study Guide The Mole

**SA Dillow**



## **Chapter 10 Study Guide The Mole:**

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