

**Interactive Classroom**

**Glencoe Science**

# CHEMISTRY

MATTER AND CHANGE

## Chapter 10

The Mole

**Mc  
Graw  
Hill** **Glencoe**

Click the mouse button or press the Space Bar to continue.

## Section 10.1 Measuring Matter

### Objectives

- **Explain** how a mole is used to indirectly count the number of particles of matter.
- **Relate** the mole to a common everyday counting unit.
- **Convert** between moles and number of representative particles.

### MAIN Idea

Chemists use the mole to count atoms, molecules, ions, and formula units.

### Review Vocabulary

**molecule:** two or more atoms that covalently bond together to form a unit

### New Vocabulary

mole

Avogadro's number



## Counting Particles

- Chemists need a convenient method for accurately counting the number of atoms, molecules, or formula units of a substance.
- The mole is the SI base unit used to measure the amount of a substance.
- 1 mole is the amount of atoms in 12 g of pure carbon-12, or  $6.02 \times 10^{23}$  atoms.
- The number is called Avogadro's number.



## Converting Between Moles and Particles

- Conversion factors must be used.
- Moles to particles

Conversion factor  $\frac{6.02 \times 10^{23} \text{ particles}}{1 \text{ mol}}$

Number of molecules in 3.50 mol of sucrose

$$3.50 \text{ mol sucrose} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol sucrose}} = 2.11 \times 10^{24} \text{ molecules}$$



## Converting Between Moles and Particles (cont.)

- Particles to moles
- Use the inverse of Avogadro's number as the conversion factor.

$$\text{Number of representative particles} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ particles}}$$

$$2.11 \times 10^{24} \text{ ~~molecules sucrose~~} \times \frac{1 \text{ mol sucrose}}{6.02 \times 10^{23} \text{ ~~molecules~~}} = 3.50 \text{ mol sucrose}$$



- How many moles are there in  $3.02 \times 10^{22}$  atoms of magnesium?





- How many atoms are in 0.750 moles of zinc?



- How many moles are there in  $1.20 \times 10^{25}$  atoms of phosphorus?





- How many molecules are there in 0.400 moles of Dinitrogen pentaoxide?

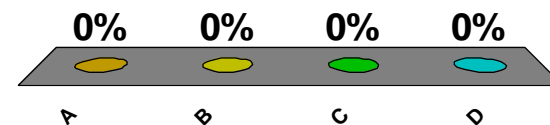


## Section 10.1 Assessment



What does the mole measure?

- A. mass of a substance
- B. amount of a substance**
- C. volume of a gas
- D. density of a gas



## Section 10.1 Assessment



What is the conversion factor for determining the number of moles of a substance from a known number of particles?

A. 
$$\frac{6.02 \times 10^{23} \text{ particles}}{1 \text{ mol}}$$

B. 
$$\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ particles}}$$

C.  $1 \text{ particle} \times 6.02 \times 10^{23}$

D.  $1 \text{ mol} \times 6.02 \times 10^{23} \text{ particles}$

