

## Section 10.3 Moles of Compounds

### Objectives

- **Recognize** the mole relationships shown by a chemical formula.
- **Calculate** the molar mass of a compound.
- **Convert** between the number of moles and mass of a compound.
- **Apply** conversion factors to determine the number of atoms or ions in a known mass of a compound.

### Review Vocabulary

**representative particle:** an atom, molecule, formula unit, or ion



# Chemical Formulas and the Mole

## MAIN Idea

The molar mass of a compound can be calculated from its chemical formula and can be used to convert from mass to moles of that compound.

- Chemical formulas indicate the numbers and types of atoms contained in one unit of the compound.
- One mole of  $\text{CCl}_2\text{F}_2$  contains one mole of C atoms, two moles of Cl atoms, and two moles of F atoms.



## The Molar Mass of Compounds

- The molar mass of a compound equals the molar mass of each element, multiplied by the moles of that element in the chemical formula, added together.
- The molar mass of a compound demonstrates the law of conservation of mass.



## Converting Moles of a Compound to Mass

- For elements, the conversion factor is the molar mass of the compound.
- The procedure is the same for compounds, except that you must first calculate the molar mass of the compound.

$$\text{Ex) } \text{H}_2\text{O} = 2 \times 1.0 + 1 \times 16.0 = 18.0 \text{ g/mol}$$



## Converting the Mass of a Compound to Moles

- The conversion factor is the inverse of the molar mass of the compound.

$$5.50 \text{ g compound} \times \frac{1 \text{ mol compound}}{185.0 \text{ g compound}} = 0.0297 \text{ mol compound}$$



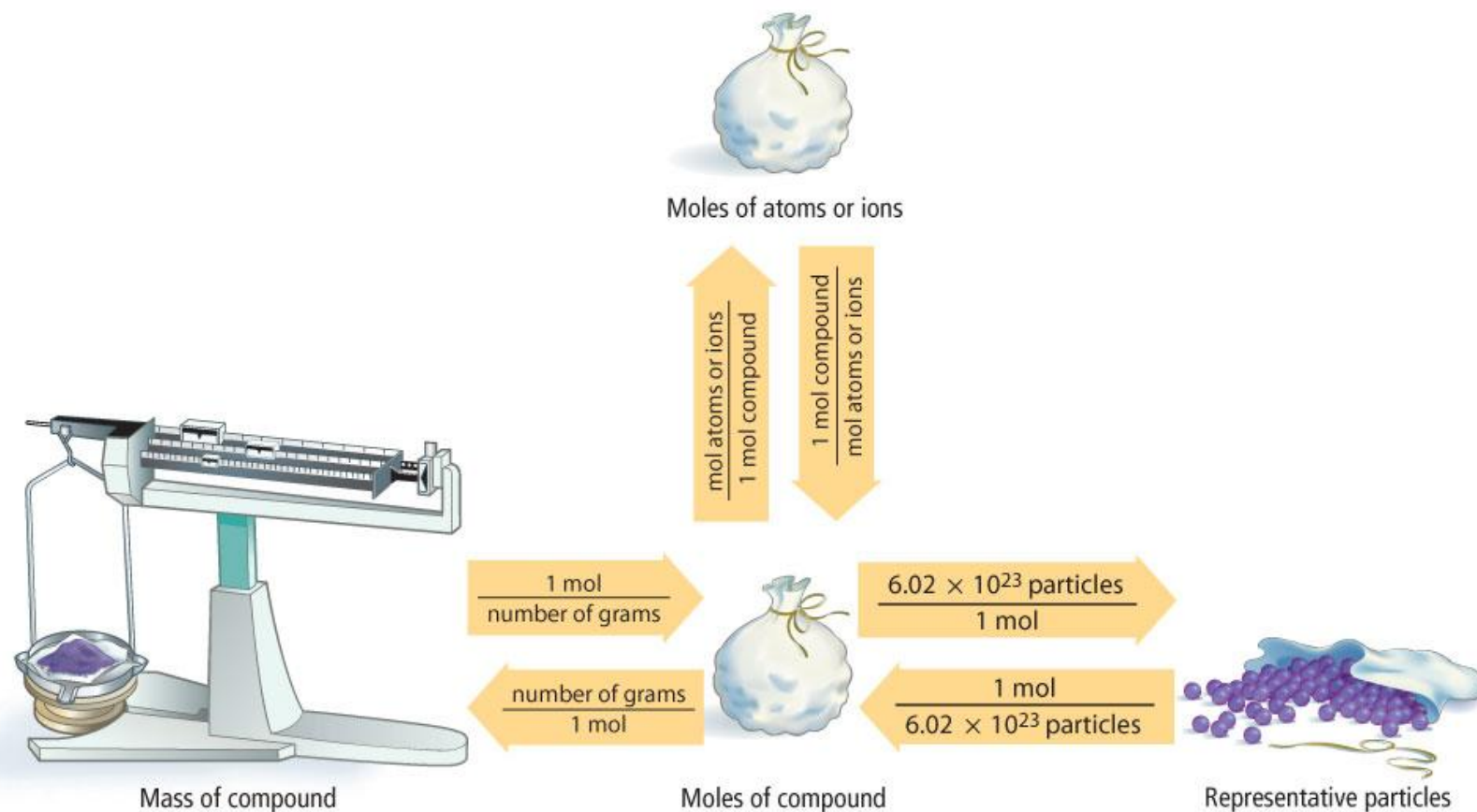
## Converting the Mass of a Compound to Number of Particles

- Convert mass to moles of compound with the inverse of molar mass.
- Convert moles to particles with Avogadro's number.



# Converting the Mass of a Compound to Number of Particles (cont.)

- This figure summarizes the conversions between mass, moles, and particles.



- How many moles of Oxygen are in 1 mol of  $\text{H}_2\text{O}$ ?
- Hydrogen?





- What is the molar mass of a molecule of  $\text{NO}_3^-$ ? *Round each to the nearest  $10^{\text{th}}$*
- What is the mass of 3.25 moles of  $\text{NO}_3^-$ ?



- If the molar mass of  $\text{CCl}_4$  is 153.8 g/mol, how many grams are there in 5.2 moles of  $\text{CCl}_4$ ?



## Section 10.3 Assessment



How many moles of  $\text{OH}^-$  ions are in 2.50 moles of  $\text{Ca}(\text{OH})_2$ ?

A. 2.00

B. 2.50

C. 4.00

**D. 5.00**



## Section 10.3 Assessment



How many particles of Mg are in 10 moles of  $\text{MgBr}_2$ ?

A.  $6.02 \times 10^{23}$

**B.**  $6.02 \times 10^{24}$

C.  $1.20 \times 10^{24}$

D.  $1.20 \times 10^{25}$

