

8/17/24

The Mole

The mole is the SI unit that measures the amount of matter a substance has; abbreviated as mol.

- 6.02×10^{23} representative particles (Avogadro's number).

Ex. How many molecules of water in 0.360 moles of water?

$$\cancel{0.360 \text{ mol H}_2\text{O}} \times \frac{6.02 \times 10^{23} \text{ molecules H}_2\text{O}}{\cancel{1 \text{ mol H}_2\text{O}}} = 2.17 \times 10^{23} \text{ molecules H}_2\text{O}$$

Ex. How many moles of Mg in 1.25×10^{23} Mg atoms?

$$\cancel{1.25 \times 10^{23} \text{ Mg atoms}} \times \frac{\cancel{1 \text{ mol Mg}}}{6.02 \times 10^{23} \cancel{\text{Mg atoms}}} = 0.208 \text{ mol Mg}$$

One atomic mass unit equals 1/12 the mass of a Carbon atom.

The molar mass is the mass, in grams, of a mole of a substance.

- Molar mass is the same number as the average atomic mass for an element.

Stoichiometry is the calculation of the quantities of reactants and products

involved in a chemical reaction.

Ex. How many grams in 9.46 moles of N_2O_3 ?

$$\cancel{9.45 \text{ mol N}_2\text{O}_3} \times \frac{76.02 \text{ g N}_2\text{O}_3}{\cancel{1 \text{ mol N}_2\text{O}_3}}$$

718 g N_2O_3

Ex. How many moles in 92.2 g Fe_2O_3 ?

$$\cancel{92.2 \text{ g Fe}_2\text{O}_3} \times \frac{\cancel{1 \text{ mol Fe}_2\text{O}_3}}{159.69 \text{ g Fe}_2\text{O}_3}$$

0.577 mol Fe_2O_3