3.1 The Mole

The mole ('mol') is a convenient measure of chemical equation.

1 mole of something = **6.0221421 x 10 ^{23}** particules of that thing.

This number is called **Avogadro's number**.

Thus , 1 mole of carbon atoms = 6.0221421 x 10 ^{23} carbon atoms.

Experimentally, a mole of ^{12}C has a mass of 12 g.

Molecules and Moles:

1 mole = 6.0221421 x 10 ^{23} molecules

We can write two conversion factors:

a) 1 mole / 6.0221421 x10 ^{23} molecules
b) 6.0221421 x10 ^{23} molecules / 1 mole

Example: How many molecules is in 3 x10 ^{23} moles?

$$\text{Given unit} \times \frac{\text{desired unit}}{\text{given unit}} = \text{desired unit}$$

3 x10 ^{23} ~~moles~~ (6.0221421 x10 ^{23} molecules / 1 ~~mole~~) = 0.500 molecules

Ions and Mole Ions:

1 mole ion = 6.0221421 x 10 ^{23} ions

We can write two conversion factors:

c) 1 mole ion/ 6.0221421 x10 ^{23} ions
d) 6.0221421 x10 ^{23} ions / 1 mole ions

Example: How many ions is in 3 x10 ^{23} mole ions?

$$\text{Given unit} \times \frac{\text{desired unit}}{\text{given unit}} = \text{desired unit}$$

3 x10 ^{23} ~~moles ions~~ (6.0221421 x10 ^{23} ions / 1 ~~mole ions~~) = 0.500 ions