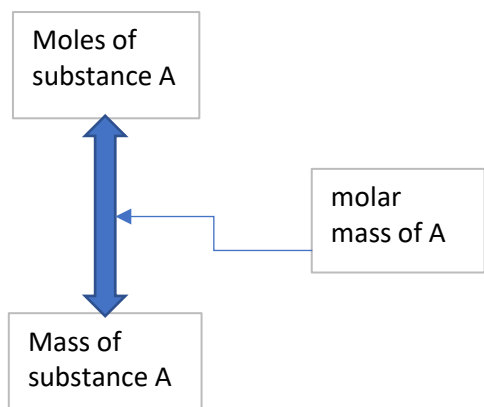


Moles to mass or mass to moles conversions



1a) Calculate the mass in grams of 1.50 moles of CH_4 molecules.

Molar mass of CH_4 is 16.05 grams/mol.

$$1.50 \text{ moles} \times \frac{16.05 \text{ grams}}{\text{mol}} = 24.1 \text{ g } CH_4$$

1b) Calculate the mass in grams of 1.68 moles of N_2 molecules.

Molar mass of N_2 molecules = $28.02 \frac{\text{grams}}{\text{mole}}$.

$$1.68 \text{ moles} \times \frac{28.02 \text{ grams}}{\text{mole}} = 47.1 \text{ g } N_2$$

1c) Calculate the mass in grams of 1.68 moles of N atoms.

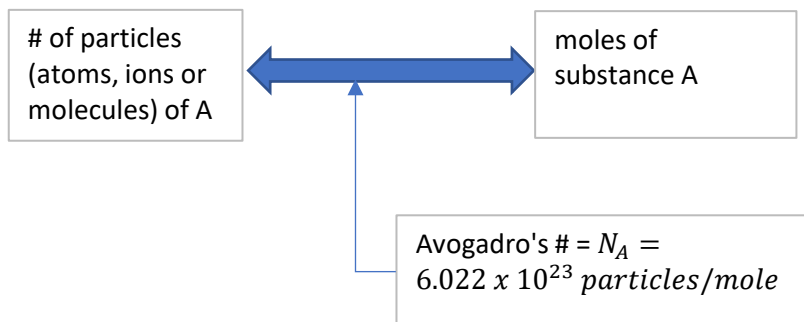
Molar mass of N = 14.01 grams/mole

1d) Calculate the number of moles of sulfur (S) atoms in 27.50 grams of sulfur.

Molar mass of S = 32.066 grams/mole

$$27.50 \text{ g} \times \frac{1 \text{ mole}}{32.066 \text{ g}} = 0.8576 \text{ moles of S}$$

of particles to moles and moles to # of particles conversions



2a) How many water molecules are there in 1.75 moles of H_2O ?

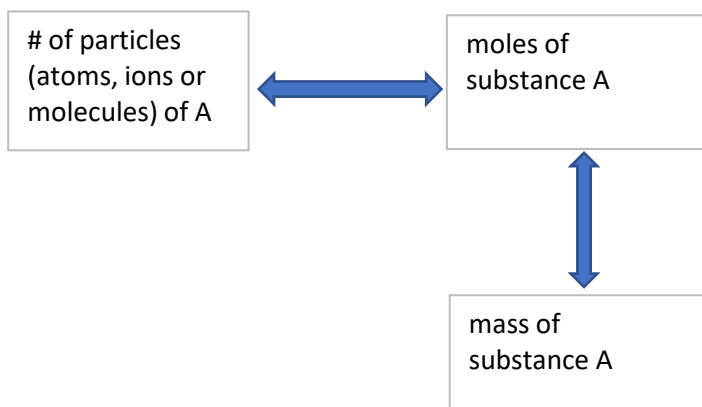
$$6.022 \times 10^{23} \text{ molecules} = 1 \text{ mole}$$

$$1.75 \text{ moles} \times \frac{6.022 \times 10^{23} \text{ molecules}}{1 \text{ mole}} = 1.05 \times 10^{24} \text{ molecules}$$

2b) How many moles of sulfur atoms are there in 9.71×10^{21} atoms of sulfur?

$$9.71 \times 10^{21} \text{ atoms} \times \frac{1 \text{ mole}}{6.022 \times 10^{23} \text{ atoms}} = 0.0161 \text{ mole}$$

Conversion from # of particles to mass and mass to # of particles



3a) What is the mass of 5.02×10^{27} molecules of water?

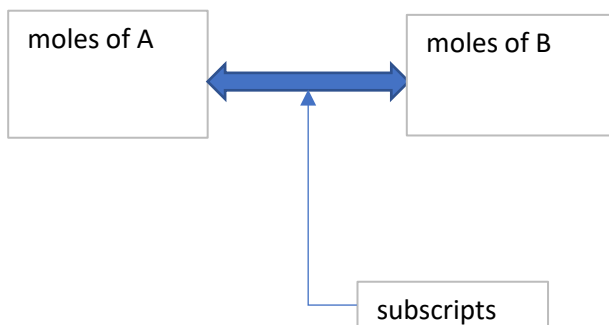
$1 \text{ mole of } H_2O = 18.02 \text{ grams}$

$$5.02 \times 10^{27} \text{ molecules} \times \frac{1 \text{ mole}}{6.022 \times 10^{23} \text{ molecules}} \times \frac{18.02 \text{ grams}}{1 \text{ mole}} = 1.50 \times 10^5 \text{ grams}$$

3b) How many atoms are there in 16.0 grams of copper?

$$16.0 \text{ grams} \times \frac{1 \text{ mole Cu}}{63.55 \text{ grams}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mole Cu}} = 1.52 \times 10^{23} \text{ atoms Cu}$$

Relationship between moles of one species to another in a formula



4a) How many moles of nitrogen atoms are there in 2.35 moles of N_2O_4 ?

$$2.35 \text{ moles } N_2O_4 \times \frac{2 \text{ moles } N}{1 \text{ mole } N_2O_4} = 4.70 \text{ moles } N$$

4b) If we have 3.76 moles of O in N_2O_4 , how many moles of N atoms are there?

$$3.76 \text{ moles } O \times \frac{2 \text{ moles } N}{4 \text{ moles } O} = 1.88 \text{ moles } N$$