

Series N° 1

Exercise 1:

1- Calculate the number of moles in 500 g of each substance. How many molecules or formula units are present in each sample?

a. CaO (lime) - b. CaCO₃(chalk) - c. C₁₂H₂₂O₁₁ [sucrose (cane sugar)] - d. NaOCl (bleach)- e. CO₂ (dry ice)

2- Calculate the mass in grams of each sample.

a. 0.520 mol of N₂O₄ - b. 1.63 mol of C₆H₄Br₂ - c. 4.62 mol of (NH₄)₂SO₃

3- Give the number of molecules or formula units in each sample.

a. 1.30×10^{-2} mol of SCl₂ - b. 1.03 mol of N₂O₅ - c. 0.265 mol of Ag₂Cr₂O₇

4- Give the number of moles in each sample.

a. 9.58×10^{26} molecules of Cl₂ - b. 3.62×10^{27} formula units of KCl - c. 6.94×10^{28} formula units of Fe(OH)₂

5- How many moles of CO₂ and H₂O will be produced by combustion analysis of 0.010 mol of styrene C₈H₈?

Molar weight in g/mol (H=1; C=12; N=14; O=16; Na= 23; Cl= 35,5; S= 32; Cr= 52; Br= 79.90; Ca= 40; Ag= 108)

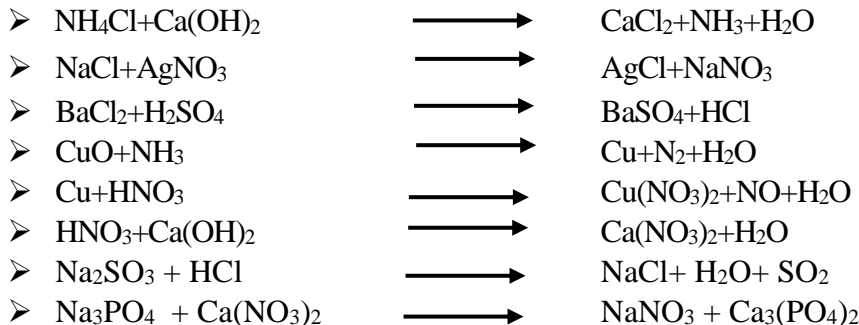
Exercise 2:

Mirex is an insecticide that contains 22.01% carbon and 77.99% chlorine. It has a molecular mass of 545.59 g. -

- What is its empirical formula? What is its molecular formula?

Exercise N° 3:

Using Lavoisier's law of Conservation of Mass, balance the following chemical reactions:



Exercise N°4

When 1.375 g of cupric oxide (CuO) is reduced on heating in a current of hydrogen, the weight of copper remaining 1.098 g. In another experiment, 1.179 g of copper is dissolved in nitric acid (HNO₃) and resulting copper nitrate converted into cupric oxide by ignition. The weight of cupric oxide formed is 1.476 g.

Show that these results illustrate the law of constant proportion.

Exercise N°5

Carbon monoxide (CO): 12 parts by mass of carbon combines with 16 parts by mass of oxygen.

Carbon dioxide (CO₂): 12 parts by mass of carbon combines with 32 parts by mass of oxygen.

Ratio of the masses of oxygen that combines with a fixed mass of carbon (12 parts): 16:32 or 1:2

Hydrogen and oxygen are known to form 2 compounds. The hydrogen content in one is 5.93%, and that of the other is 11.2%.

Show that this data illustrates the law of multiple proportions.