Abdelhafid Boussouf University Center - Mila	Academic year 2023–2024
Institute of Natural and Life Sciences LSFY	
General and organic chemistry module	Dr Bougueria Hassiba

Practical Work N°2

Determine the amount of substance (in moles)

I. Introduction:

The mole (abbreviated mol) is the SI measure of quantity of a "chemical entity," such as atoms, electrons, or protons. It is defined as the amount of a substance that contains as many particles as there are atoms in 12 grams of pure carbon-12. So, 1 mol contains 6.023×10^{23} elementary entities of the substance.

The Avogadro number (NA) is the proportionality factor that relates the number of constituent particles (usually molecules, atoms or ions) in a sample with the amount of substance in that sample.

With:

$$n = \frac{m(g)}{M(g/mole)}$$

Special case of liquid:

The density of a body is defined as the amount of mass contained per unit volume of the body.

$$\rho = \frac{mass}{volume}$$

The density of water is about 1000 kg/m³ or 1 g/cm³, because the size of the gram was originally based on the mass of a cubic centimeter of water.

Density (without unit) of a solid or liquid body A, denoted d(A), is the density of this body (A) divided by the density of water.

$$d = \frac{\rho(A)}{\rho(water)}$$

Special case of Gaz:

Gases are compressible, meaning that when put under high pressure, the particles are forced closer to one another. This decreases the amount of empty space and reduces the volume of the gas. Gas volume is also affected by temperature. When a gas is heated, its molecules move faster and the gas expands. Because of the variation in gas volume due to pressure and temperature changes, the comparison of gas volumes must be done at normal condition of temperature and pressure.

Normal condition of temperature and pressure (NCTP) is defined as 0°C (273.15K) and 1atm pressure. **The molar volume** of a gas is the volume of one mole of a gas at NCTP. At NCTP, one mole (6.023×10^{23} representative particles) of any gas occupies a volume of 22.4 L.

$$n = \frac{V(Gaz)}{Vm}$$

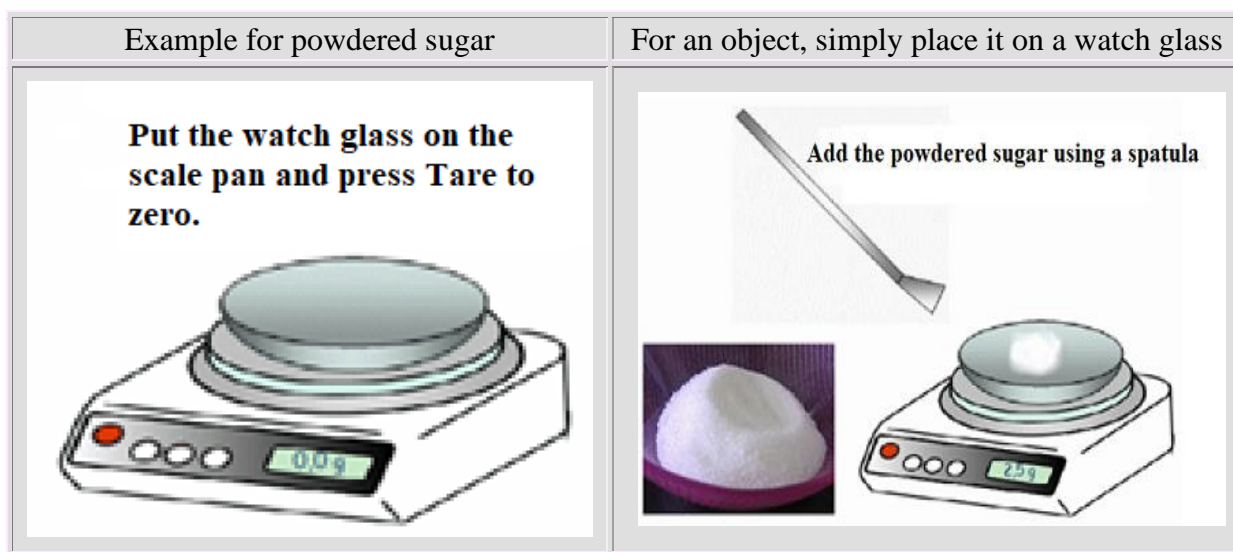| Abdelhafid Boussouf University Center - Mila | Academic year 2023–2024 |
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II. *Aim :*

- Explain the relation between mass, moles, and numbers of atoms or molecules, and perform calculations deriving these quantities from one another

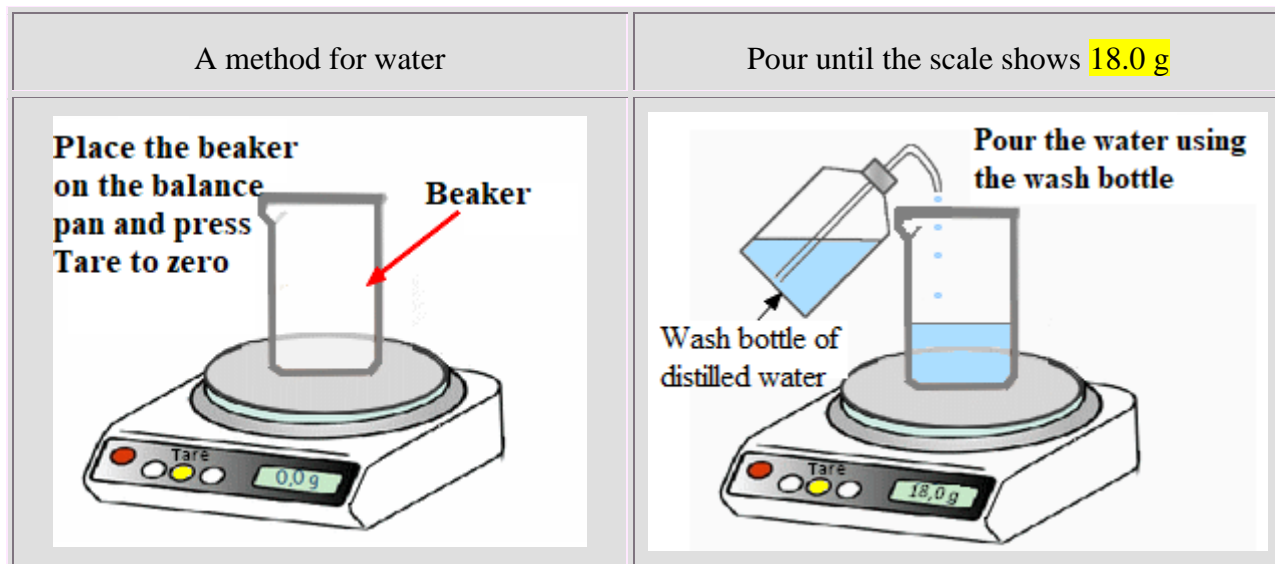- Determine the quantity of material contained in a given sample of pure substance.

III. *Determine the quantity of material:*

1. *Procedure:*

   a. *Using a balance, weigh each sample (copper plate, piece of chalk and piece of sugar).*

Example for powdered sugar	For an object, simply place it on a watch glass
Put the watch glass on the scale pan and press Tare to zero.	Add the powdered sugar using a spatula

   b. *The operating protocol allowing **one mole of water** to be poured into a beaker.*

A method for water	Pour until the scale shows 18.0 g
Place the beaker on the balance pan and press Tare to zero Beaker	**Pour the water using the wash bottle** Wash bottle of distilled water

Pour the liquid into a graduated cylinder and note the corresponding volume V of water.