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PRATICAL WORK N° 02

PREPARATION OF SOLUTION

Objective of practical work:

The main objective of this manipulation is to prepare a solution from:

1. **Commercialised solution** of sulfuric acid H_2SO_4.
2. **Mother solution** prepared in question 1: the prepared solution in this case named **daughter solution**.
3. **A solid chemical** as well as potassium hydroxide KOH.

Principal of manipulation:

These solutions can be prepared by:

1. **Dissolution liquid-liquid**: in this case a precise volume taken from the commercialised solution is dissolved in volume of solvent (e.g. distilled water).
2. **Dilution**: consist in preparing, from a **mother solution, that we know its concentration, a daughter solution** whose concentration **is lower.**
3. **Dissolution solid-liquid**: here, a calculated amount of chemical solid is dissolved in solvent.

Operating mode:

1. **Preparation of mother and daughter solutions of sulfuric acid: Dissolution liquid-liquid**

A commercialised solution of sulfuric acid

is defined by its: d= 1,83

purity = 95%

→

Mother solution defined by its concentration and volume

C= 1M (mol.L^{-1}).

V=100 mL

↓

Daughter solution that we know its mass concentration and volume desired

Cm= 19.6 g.L^{-1}

And volume V=50mL

2. **Preparation of stock solution from chemical solid potassium hydroxide KOH: dissolution solid-liquid**

Potassium hydroxide is defined by its:

Purity= 85%

M=56.11 g.mol^{-1}

→

Preparation of solution with a molar concentration: C= 0.1M (mol. L^{-1})

And volume V= 100ml

Reminder:

- **Normality (N):** is **the number of gram-equivalents** of ***solute*** per **litter of *solution*.**
- **Normality = number of gram equivalents x Molarity; N=z. M**
- **The gram-equivalent: is the quantity of solute comprising one mole of the particles considered (H^+, OH^-etc.)**
- **The mass titter (mass concentration): is the weight concentration expressed in mass unit per litter of solution, generally expressed in g. L^{-1}; Cm =m/V; MM (molar mass) = Cm/Cn.**

Note: "Addition of solvent (eg. water) to a solution does not change the amount of solute, but it changes the concentration of solution, so in this case we can write:

$$n_1 = n_2 \Rightarrow N_1V_1 = N_2V_2 \text{ (when } z \neq 1)$$

$$\text{and } C_1V_1 = C_2V_2 \text{ (when } z=1)$$

Equipment used

Volumetric flask (V=50 and 100 mL;)

Volumetric and graduated pipette (V=10 and 5 mL);

Beaker (V=50 and 100 mL); Pipette pear; Spatula; Funnel; Electronic scale; Watch glass.

Chemicals used

Commercialised solution of H_2SO_4 (95%, d=1.83);

Potassium hydroxide KOH;

Distilled water.

Work to be done

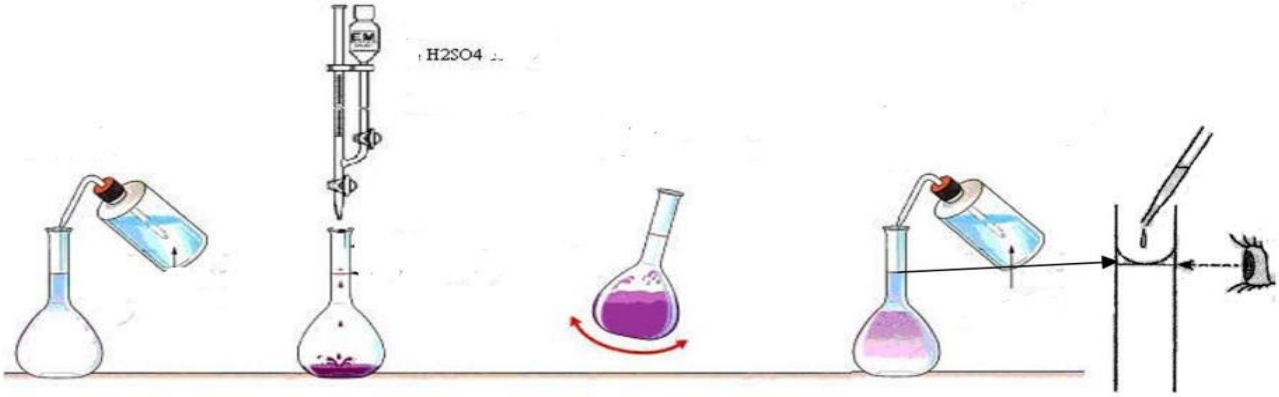
Safety rule: The dilution of a concentrated acid in water **releases heat**, can cause **spattering**. Therefore, we can receive droplets of acid solution on ourself. So, it is important to remember this **safety rule** when preparing acidic solution:

when diluting a concentrated acid, put some water in the volumetric flask before to introduce the amount of concentrated solution. Mix and then top up to the gauge line.

1. Preparation of 100 mL of sulfuric acid (1 M): preparation of mother solution

Calculate **the mass of solute (acid)** necessary for the preparation of the requested solution? Deduce **the volume of** concentrated acid needed?

In **a 100 mL** volumetric flask, **put some distilled water.** Using a burette under **fume hood**, take the calculated volume of H_2SO_4. Fill with distilled water up to the mark, close then shake **(follow diagram 01).**



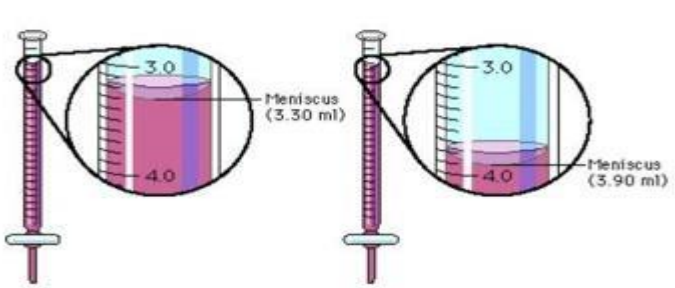


Diagram 01

2. Preparation of 50 mL of sulfuric acid (19.6 g/L): preparation of daughter solution

Calculate **the necessary volume** of to be taken from **the mother solution** for preparing **the daughter solution**?
In **a 50 mL** volumetric flask, introduce the calculated volume using a graduated pipette. Fill the flask up to the mark with distilled water, close and shake. **(Follow the diagram 02).**

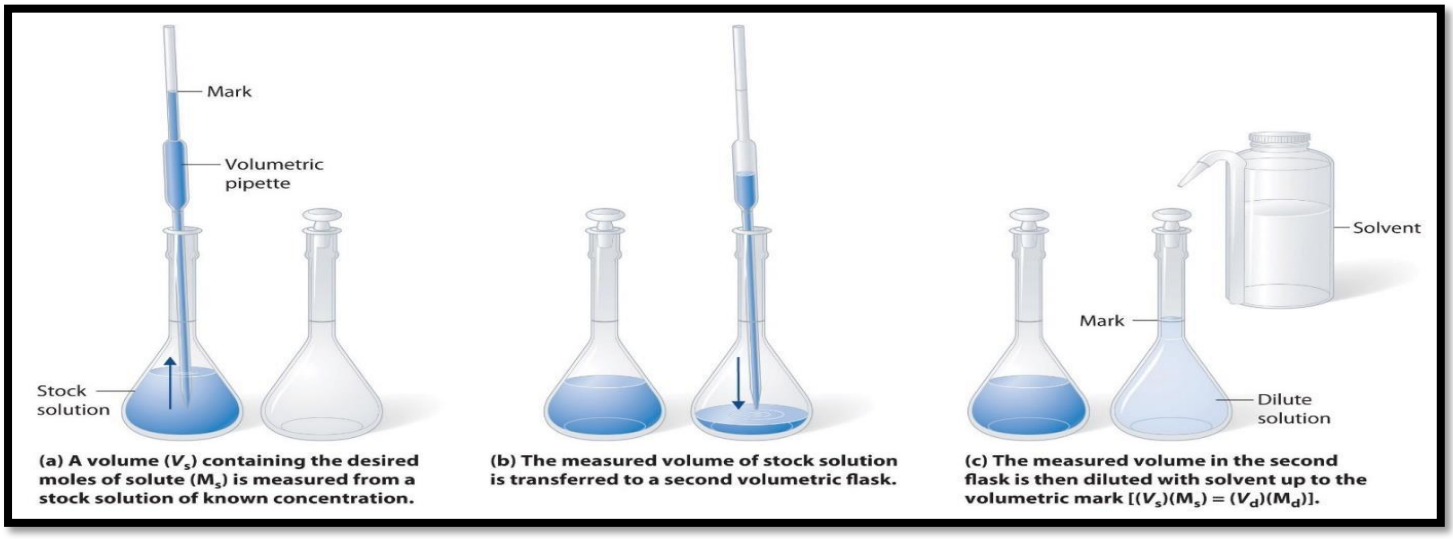


Diagram 2

3. Preparation of 100 mL of potassium hydroxide (0.1 M):

Safety rule: don't touch the pellets of hydroxide sodium with fingers. U se the watch glass to weigh and gloves to protect your hand, this chemical is very corrosive.

Quickly close the bottle to prevent the sodium hydroxide from becoming hydrated and carbonated in the air

1. Calculate **the mass** of sodium hydroxide **(KOH)** required for the requested solution?

2. Weigh the calculated mass.

3. In a **100 mL** volumetric flask filled halfway with distilled water, add the calculated mass of KOH. Shake until complete dissolution then complete to the mark **(Follow diagram 03).**

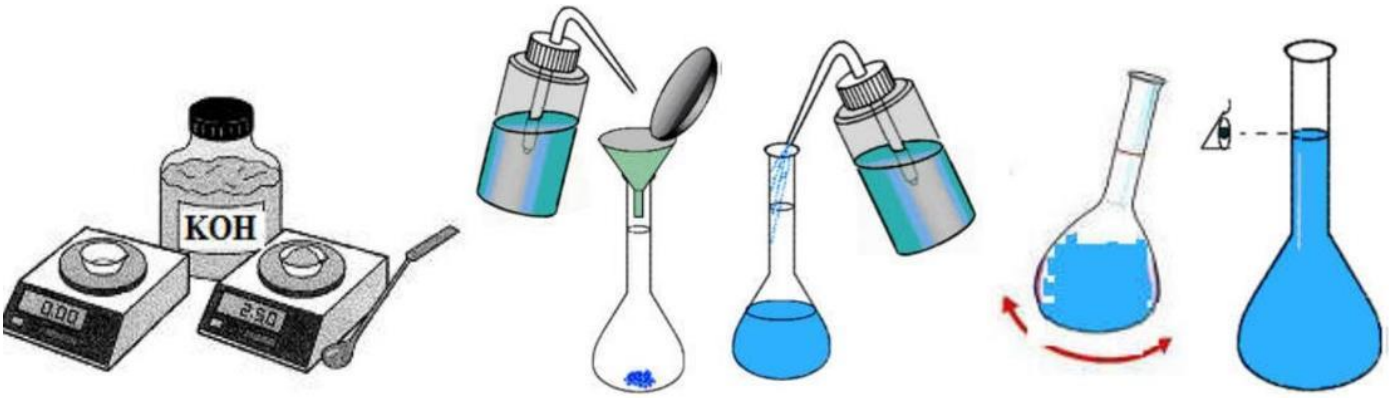


Diagram 3