

## **TP No. I. Safety in the laboratory of chemistry introduction to volumetric measurements and preparation of solutions**

### **I. Introduction:**

Conducting practical chemistry experiments in a laboratory necessitates the manipulation of substances that are toxic, flammable, corrosive, and explosive. Engaging in such activities poses the risk of accidents or severe poisoning. It is essential for every student working in the chemistry laboratory to comprehend the potential consequences and hazards associated with the manipulations being conducted. Consequently, strict adherence to safety rules is crucial and should be consistently practiced.

### **II. Safety Rules:**

The greatest danger in a laboratory is the student, if he is ignorant or careless, or both. Remember that you should never enter a laboratory without authorization.

- 1- Wearing a blouse is obligatory, it must be cotton and long enough,
- 2- The student must be attentive and avoid any thoughtless or hasty behavior,
- 3- You must have knowledge of the work to be accomplished,
- 4- Never run or rush into a laboratory,
- 5- Do not put anything in your mouth in a laboratory,
- 6- Do not touch equipment in a laboratory without reason,
- 7- Never take anything from a laboratory without permission,
- 8- Always wear glasses when your teacher asks you to,
- 9- Never point a test tube towards yourself or anyone else,
- 10- Any accident and any breakage or damage to equipment, even minor, must be reported immediately to your teacher.

If you get burned or if a product is splashed on your skin, wash the affected area immediately with plenty of water.

### **III. Laboratory Hazards:**

There are four (4) types of chemicals: 1) Toxic substances, 2) Caustic substances, 3) Explosive substances 4) Flammable substances.

Toxic and caustic substances: NaOH, HCl, H<sub>2</sub>SO<sub>4</sub>, etc. can irritate the skin.

#### **Cases of burns:**








- a) by acids: wash with plenty of water then with sodium bicarbonate then with water.
- b) with soda (NaOH) or potash (KOH): wash with plenty of water then with acetic acid (CH<sub>3</sub>COOH) at 1%.

#### **Accident to the eyes:**

- a) basic splashes (soda, ammonia, etc.): wash with pure water then with 1% boric acid,
- b) glass fragments: wash with sufficient water.

### **IV. Symbols used on labels:**

Here is the list of danger symbols which appear on the labels stuck to the bottles:

Symbole (Pictogramme)	Description of risks	Example
 <p>T - Toxique      T+ - Très toxique</p>	<p>Substances which harm health by inhalation, ingestion or skin absorption and can cause death.</p>	<p>Methanol, benzene, phenol, naphthalene, white phosphorus, hydrogen sulfide, hydrogen cyanide more than 7%.</p>
 <p>Xi - Irritant</p>	<p>Xi= irritant = irritate the skin, eyes and respiratory organs. Xi(n)=inhalation, ingestion or skin absorption are harmful to health.</p>	<p>Dichloromethane, trichlorethylene, potassium dichromate, diluted bleach, ammonia between 5 and 10%.</p>
 <p>F - Facilement inflammable      F+ - Extrêmement inflammable</p>	<p>F = Product that can easily ignite under the influence of an ignition source. F+ = Product that can ignite very easily under the action of an energy source even below 0°C.</p>	<p>Acetone, ethanol, Acetylene, diethyl ether, insecticide sprays.</p>
 <p>O - Comburant</p>	<p>Products that can promote or activate the combustion of a combustible substance. In contact with packaging materials (paper, cardboard, wood) or other combustible substances, they may cause a fire.</p>	<p>Nitric acid at 70% and above, peroxides, chromium VI oxides, weed killers (sodium chlorate)</p>
 <p>C - Corrosif</p>	<p>Product capable of having a destructive action on living tissues.</p>	<p>Hydrochloric acid and more, phosphoric acid, concentrated bleach, ammonia</p>
 <p>E - Explosif</p>	<p>These are liquids or solids capable of exploding under the action of shock, friction, flame or heat.</p>	<p>Butane, propane in certain percentage of mixture with air, TNT (trinitrotoluene).</p>
 <p>N - Dangereux pour l'environnement</p>	<p>Products which may present an immediate risk for one or more components of the environment (for example causing damage to fauna, flora, causing pollution of natural waters and air).</p>	<p>Lindane (pesticides), carbon tetrachloride.</p>