

## CLIL - Introduction to analytical chemistry

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Analytical Chemistry is a branch of chemistry that deals with the analysis of substances, so called analytes, present in the sample qualitatively and quantitatively. In order to accomplish this analysis we must know the physical and chemical properties of these substances. In other words analytical chemistry deals with the separation, identification and determination of substances in a sample. It also includes coverage of chemical equilibrium and statistical treatment of data. Sample is anything that comes to mind in the air, water, soil, food and living organisms such as a piece of rock or a piece of meat or some water from the tank of the house or from a river or a lake or a sea or some tissue or blood from humans or animals or some vegetables... etc. The sample is taken to the laboratory and analyzed for its substances (analytes) after pretreatment and the final step is the calculations of the percentage of each substance in the sample. An analyte is a constituent of a sample that is analyzed for, and its concentration is determined. Analytical chemistry can be broken down into two general areas of analysis: Qualitative analysis and Quantitative Analysis and each one of these two types can be either classical or instrumental as we will see.

### ■ Qualitative Classical Analysis

This analysis detects (identify) the type of all or some of the substances present in the sample (elements or ions or compounds). In other words it gives an answer to the question: What substances are present in a sample? these substances can be detected either by a chemical reaction For example, when you add silver nitrate solution to the sample solution a white precipitate formation indicates the presence of chloride ion in the sample. There are also many reagents that give distinctive colors with some of the substances and can be used in the detection of these substances. The flame also can be used for the detection of some common metals.

### ■ Quantitative Analysis

This analysis gives knowledge of the amount of all or some of the substances present in the sample and uses two types of analysis depending on the concentration of the substance in the sample, namely classical chemical analysis and instrumental analysis.

### ■ Classical chemical analysis

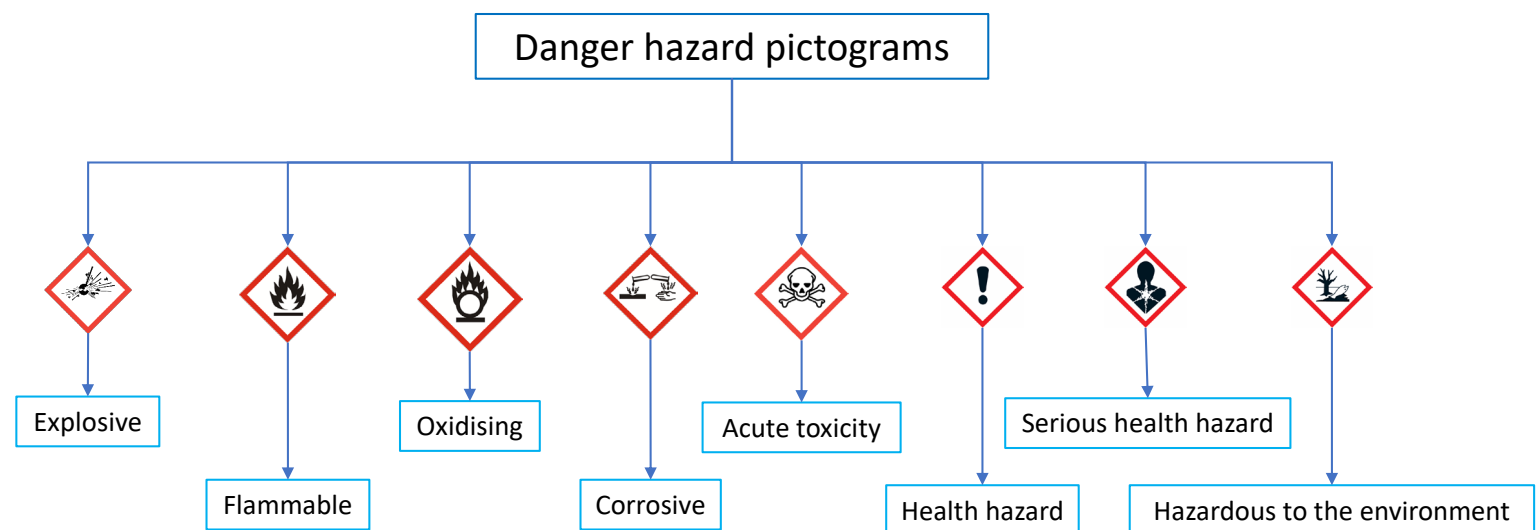
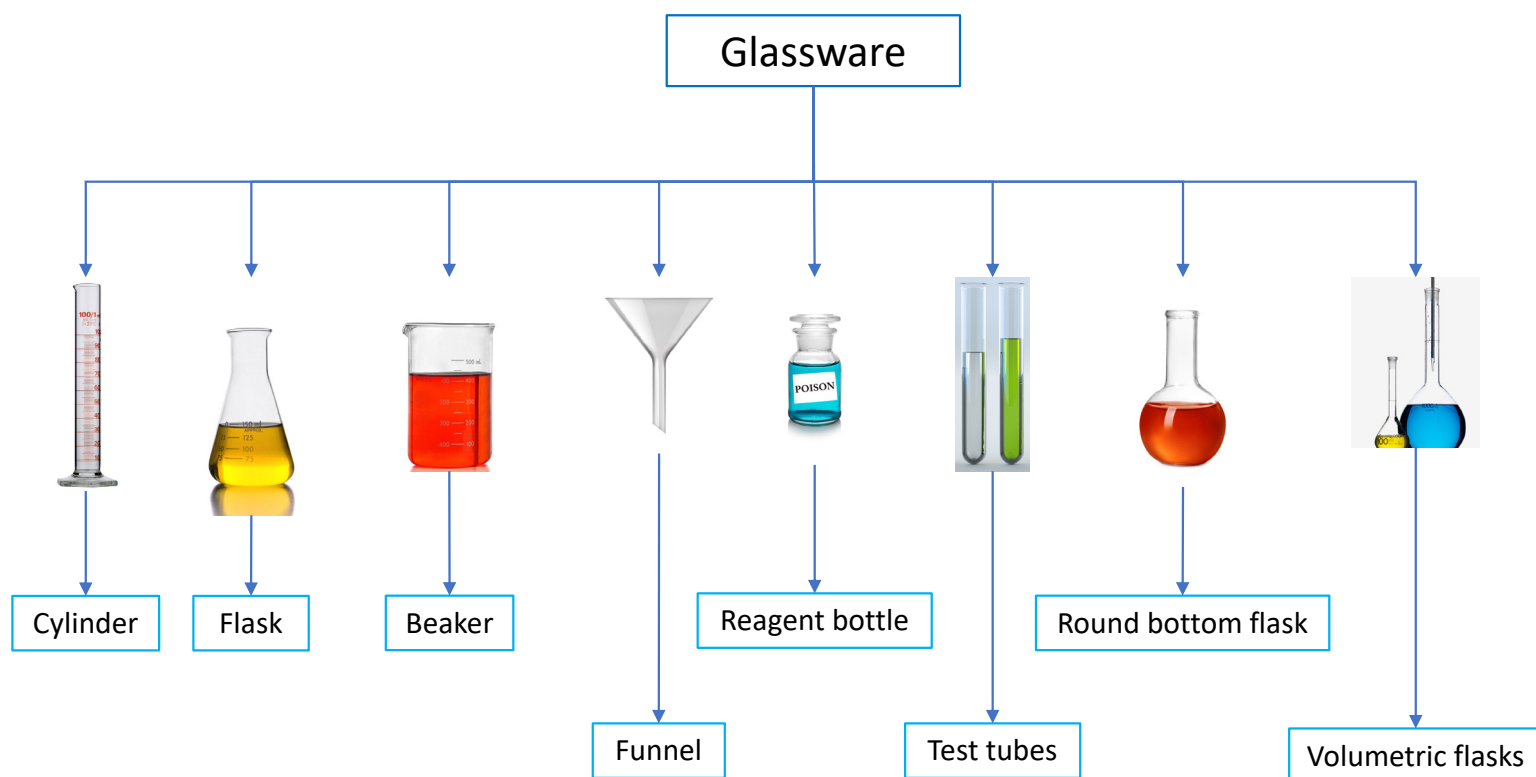
This analysis depends on the chemical reaction, such as volumetric analysis and gravimetric analysis, as we shall see later in this book. And it uses simple equipment such as burettes, balances, flame, furnace. And is used to estimate high concentrations (more than 0.001 M).

### ■ Instrumental Analysis

This type of analysis uses instruments and depends on the physical and physico-chemical properties of the substance being analyzed (analyte) such as absorption or emission of electromagnetic radiation (spectroscopic methods of analysis) or electrical properties of the substance being analyzed such as voltage or current intensity or electrical conductivity..... etc. (electrochemical methods of analysis) and finally the methods of separation such chromatography.

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■ MAPS



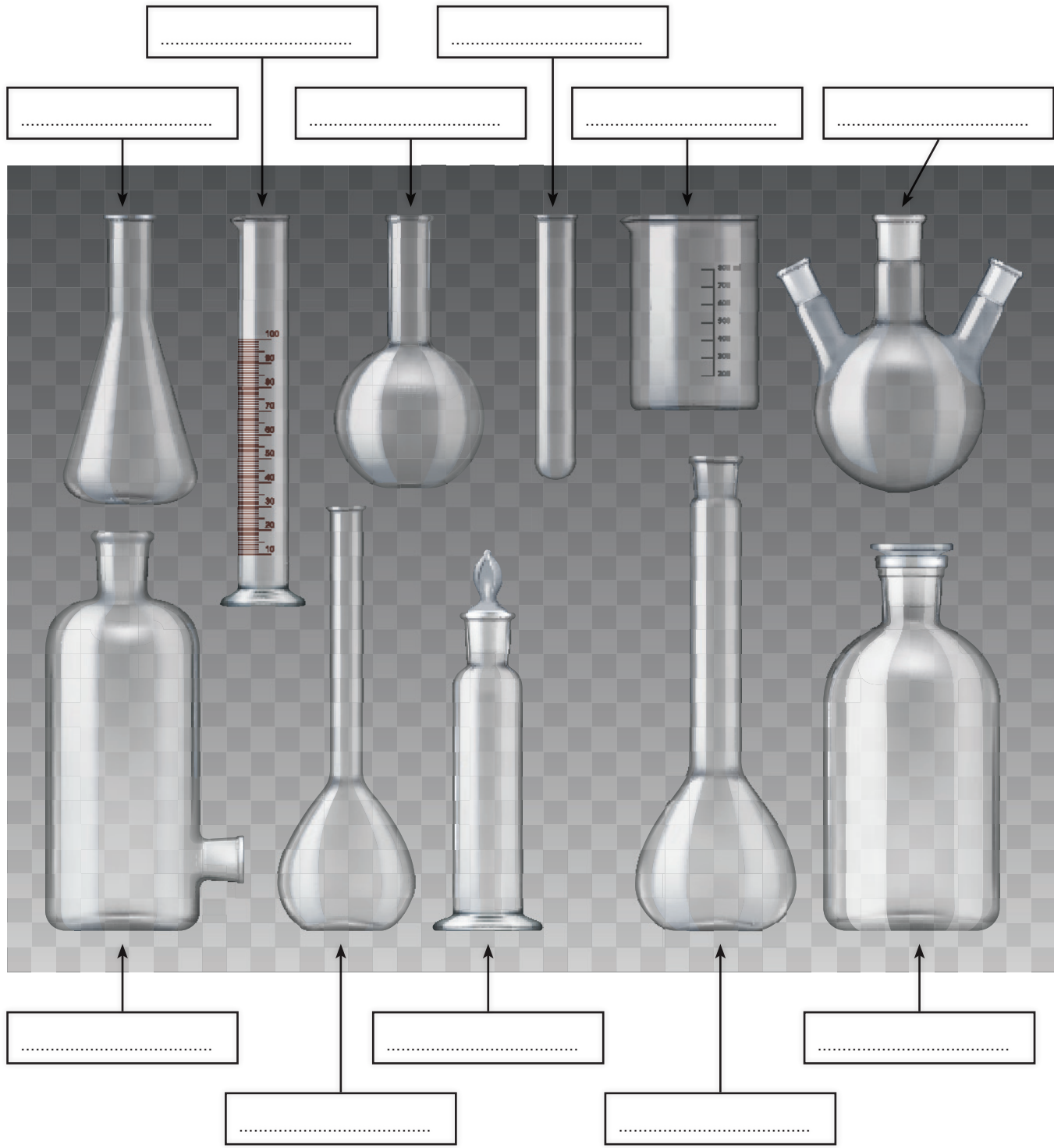
■ TEACHING AIMS:

- Understanding the meaning of Analytical Chemistry;
- Understanding the differences between Qualitative Classical Analysis and Quantitative Classical Analysis;
- Understanding the classification of techniques in Analytical Chemistry;
- Understanding the differences between classical and instrumental Analytical Chemistry;

■ EXERCISES (read the text and the maps)

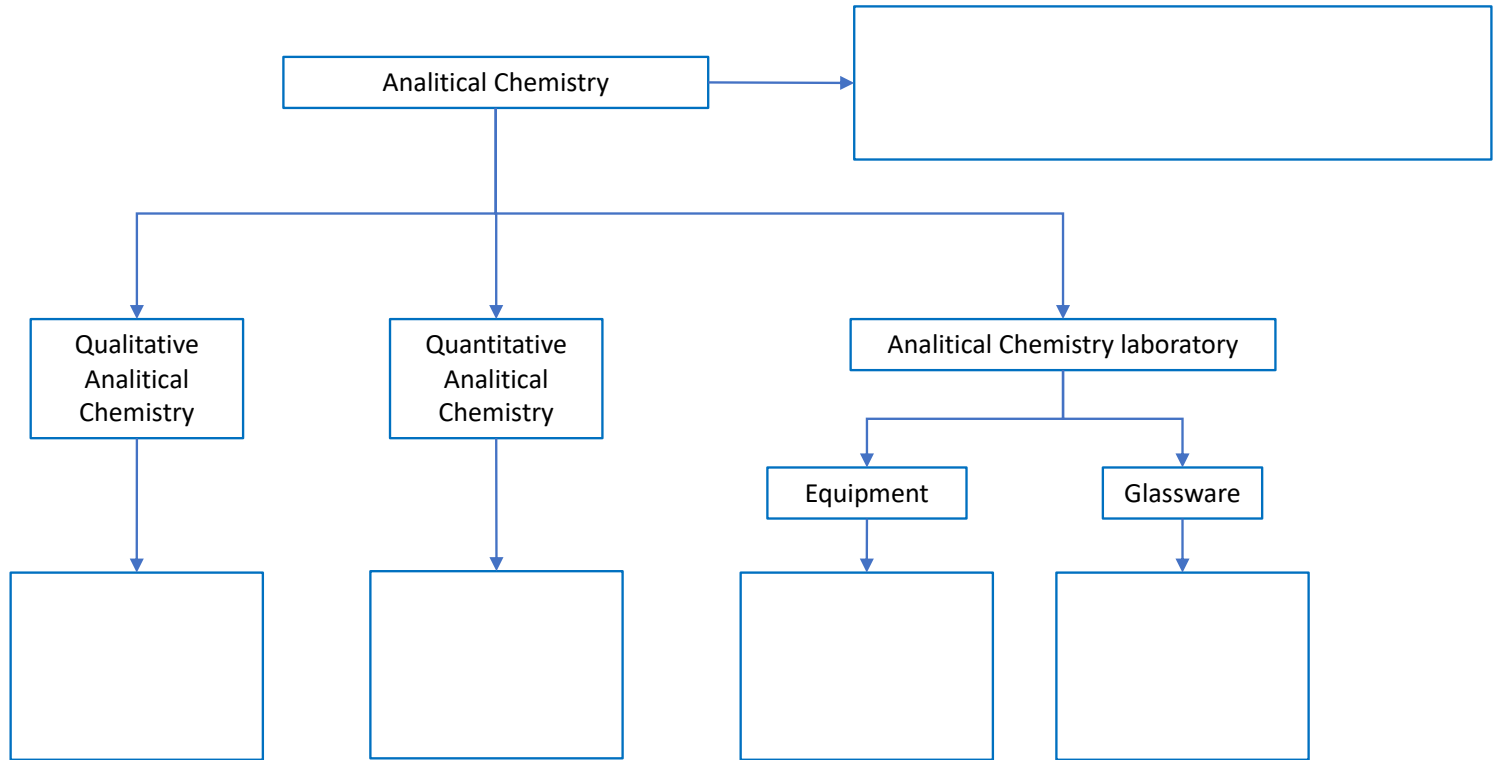
1 Match the words in the right spaces (use dictionary if needed):

ground neck flask, Dreschel bottle, funnel, becher, flask, volumetric flask, cylinder, test tube, three-necked balloon, distilled water bottle, round bottom flask, reagent bottle.



**2 Insert the sentences in the right place (use dictionary if needed)**

- Laboratory bench, laboratory cabinet, faucet, electrical outlets, laboratory hood;
- This analysis gives knowledge of the amount of all or some of the substances present in the sample
- Is a branch of chemistry that deals with the analysis of substances, said analytes
- Becher, flask, test tube, cylinder, burette, stirring rod, funnel, pipette, bottle,
- This analysis detects (identify) the type of all or some of the substances present in the sample



**3 Fill the gaps**

