

# Safety and Hazardous Chemicals

**Hazard :-** The hazard is anything that has the potential to cause harm in terms of injury, ill-health or damage to the environment, for example, working with dangerous chemicals or processes which give rise to dusts or fumes.

**Identify the Hazards :-** This involves identifying the chemicals you have in your workplace and the hazards associated with them.

**Hazards chemicals :-** There are many ways chemicals can enter the body like

- 1- By inhalation, where breathing in contaminated air is the most common way that workplace chemicals enter the body.
- 2- By contact with the skin or eye, some chemicals can damage the skin or eye like irritation or pass through the skin into the body.
- 3- Ingestion :- workplace chemicals may be swallowed accidentally if food or hands are contaminated.
- 4- Injections :- Through indirect injection (wrong injection)

**Types of chemical health hazards :-** Chemicals health hazards are classed as either acute or chronic.

- 1- The acute hazards are asphyxiation, acids burns, dizziness, nausea and vomiting.
- 2- The chronic hazards are issues that may take some time to develop symptoms such as bronchitis, dermatitis, cancer and liver damage.

Classifying hazardous chemicals:- The classification process assigns categories to hazardous chemicals based on agreed hazard classification criteria.

The classification includes, (GHS classification)

- 1- physical hazard, for example flammability
- 2- Health hazard, for example toxicity and carcinogenicity
- 3- Environmental hazard, for example hazardous to the aquatic environment.

Classifying hazardous chemicals according to hazards to

- 1- Toxic materials for example mercury, arsenic, Polonium
- 2- Incendiary materials like sulfuric acid, hydrochloric
- 3- Carcinogens like Uranium, Benzene and Lead
- 4- Flammable materials like Carbon disulfide, Alcohol
- 5- Oxidants materials like ammonium nitrate, hydrogen peroxide
- 6- Radioactive materials like uranium, phosphate
- 7- Explosive materials like ammonium nitrate and gas cylinders.
- 8- Irritating materials like solvents e.g acetone, ethanol, and like weak acids e.g acetic, citric. The oxides e.g  $Ag_2O$ ,  $Al_2O_3$

# Importance of analytical chemistry

Analytical chemistry is applied in all areas of science industry and medicine.

Analytical chemistry is important in the field of medicine because it helps to measure the level of important nutrients in human body like carbohydrates, lipids, proteins and sugars.

Analytical chemistry also helps in disease diagnosis, for example diseases like diabetes, high levels of cholesterol and other bacterial and viral diseases can be diagnosed by the help of quantitative and qualitative analysis.

Analytical chemistry also help in determining the levels of toxic waste in the body like uric acid, cholesterol, drugs, and some salts, this helps in diagnosis of many diseases.

Analytical chemistry plays a very important role in biological studies and clinical assays.

Analytical chemistry has wide spread applications from quality control in food industries. It used in analysis of steel during its production for carbon, nickel and chromium to achieve a desired strength, hardness, and ductility.

Importance of qualitative analysis:- Reveals identity of the elements and compounds in a sample.

Importance of quantitative analysis:- Indicates the amount of each substance in a sample, %, concentration.

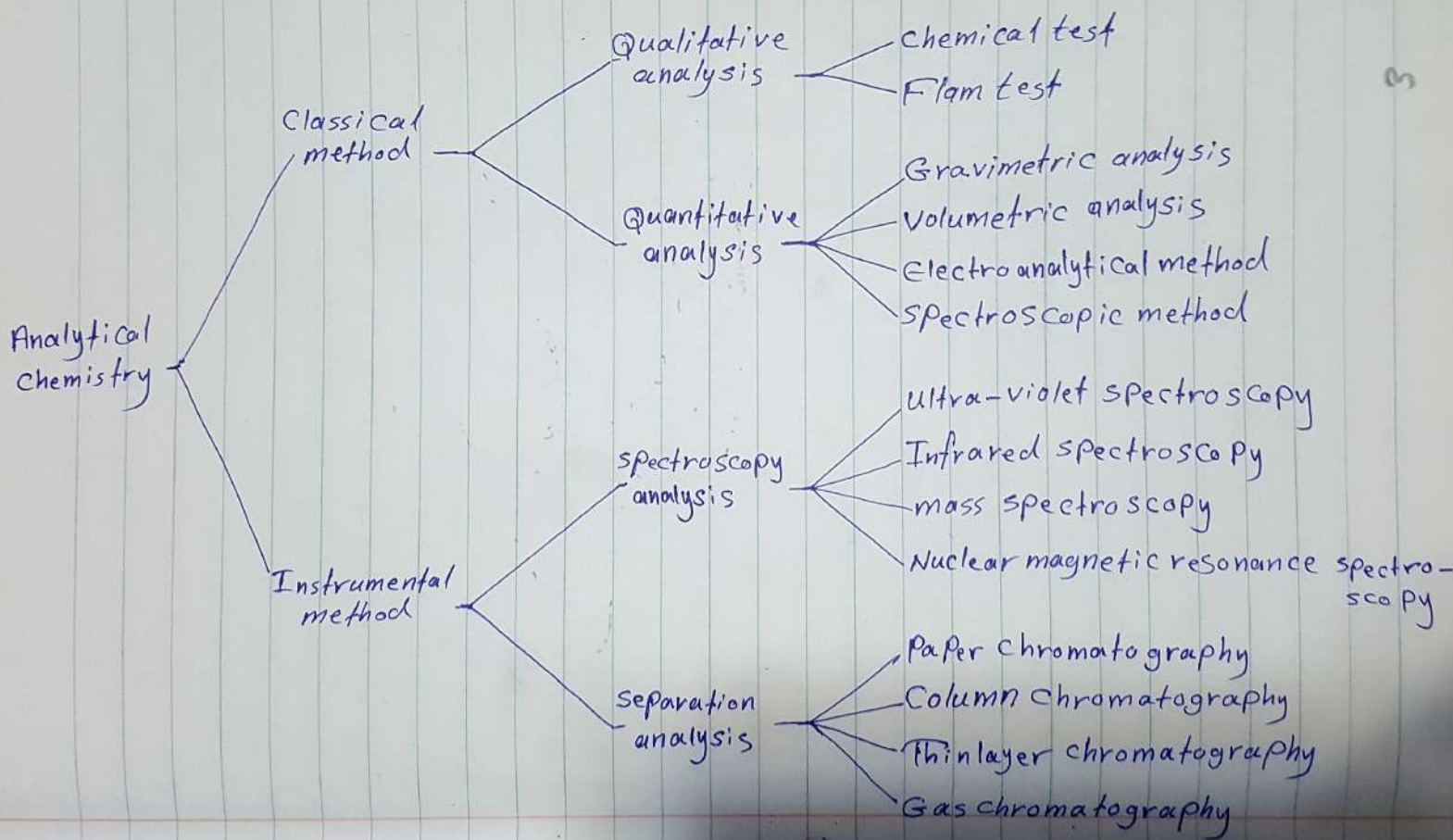
Quantitative analytical measurements also play a vital role in biochemistry, biology, geology, physics and the other sciences

The importance of analytical chemistry is the determination of the chemical composition of matter. It is the main goal of analytical chemistry. However, the identification of a substance, the elucidation of its structure and quantitative analysis of its composition are the aspects covered by modern analytical chemistry. The most difficult task for an analytical chemist is to explain what analytical chemistry is?

The importance of analytical chemistry is of many applications they are as follows.

- 1- Inorganic
- 2- Organic
- 3- physical
- 4- Biochemistry
- 5- Environmental science
- 6- Agricultural Science
- 7- Biomedical and clinical chemistry
- 8- Solid state research
- 9- Electronics

# Classification of methods of analytical chemistry



## Classical methods

### Advantages and disadvantages of classical methods

Advantages are

- 1- Simple method
- 2- Accurate method
- 3- Based on absolute measurements.
- 4- The devices and tools used are cheap

Disadvantages are

- 1- Lack of specificity
- 2- It takes along time
- 3- Accuracy decreases with decreasing amounts of analyte.
- 4- Affected by external environmental factors.

## Instrumental methods

### Advantages and disadvantages of instrumental methods

Advantages are

- 1- Rapid method
- 2- Use small amounts of sample.
- 3- Complex samples analysis
- 4- High sensitivity
- 5- Its measurements possess high reliability
- 6- Not affected by external factors.

Disadvantages are

- 1- It need a calibration curve.
- 2- Accuracy and sensitivity depend upon the chemical method used for the calibration process as well as the device
- 3- The costs of the devices and their sustainabilty processes are expensive.
- 4- These devices require technicians.