
بسم الله الرحمن الرحيم

TOPIC : FORENSIC SCIENCE

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SECTION : C M.SC CHEMISTRY

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Introduction

➢ Forensic Science .

Forensic science is the application of science to those crime and civil laws that are enforced by police “An agencies in a crime justice system.

➢ Forensic Chemistry .

- Forensic chemistry is the application of chemistry in the identification of unknown materials found at a crime.

fig 1# a crime scene

Role in investigation

- In fire explosive ; if an accelerant such as gasoline or kerosene was used; if so, fire was intentionally set
- In Bomb blast; the identification of RDX or C-4 would indicate a military connection .
- The identification of TNT would create a wider suspect list, since it is used by demolition companies as well as in the military.
- During poisoning investigations . the detection of specific poisons can give detectives an idea .
- An investigation that involves ricin would tell investigators to look for ricin's precursors, the seeds of the castor oil plant.

Technologies and methods

- **Spectroscopy**

The two main spectroscopy techniques for forensic chemistry are FTIR and AA spectroscopy **.**

FTIR.

- (Fourier transform infrared spectroscopy) is a nondestructive process that uses infrared light to identify a substance.

AAS.

- AAS is a destructive technique that is able to determine the elements that make up the analyzed sample.

Fig 2// FTIR spectrometer.

Chromatography

- **TLC**.

TLC can be used to analyze inks and dyes by extracting the individual components.

- **HPLC**

HPLC is used for nonvolatile mixtures that would not be suitable for gas chromatography.

- **GC**

In forensic chemistry, the most common GC instruments use mass spectrometry as their detector. but it is used just for volatile mixtures.

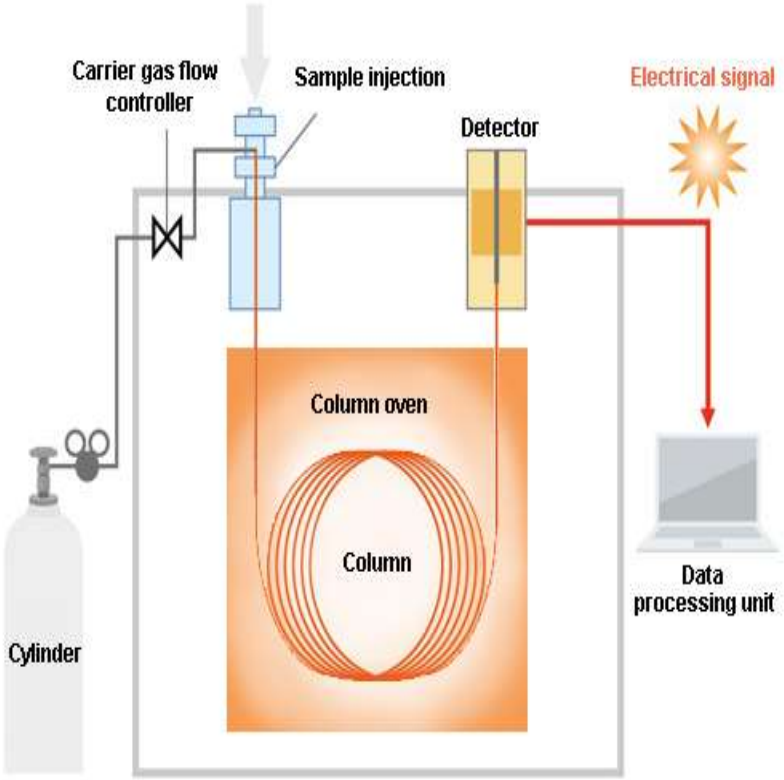

FIG. 3 # Gas chromatography

Electrophoreses.

- Electrophoresis is used in laboratories to separate macromolecules based on size. The technique applies a negative charge so proteins move towards a positive charge. Electrophoresis is used extensively in DNA, RNA and protein analysis.

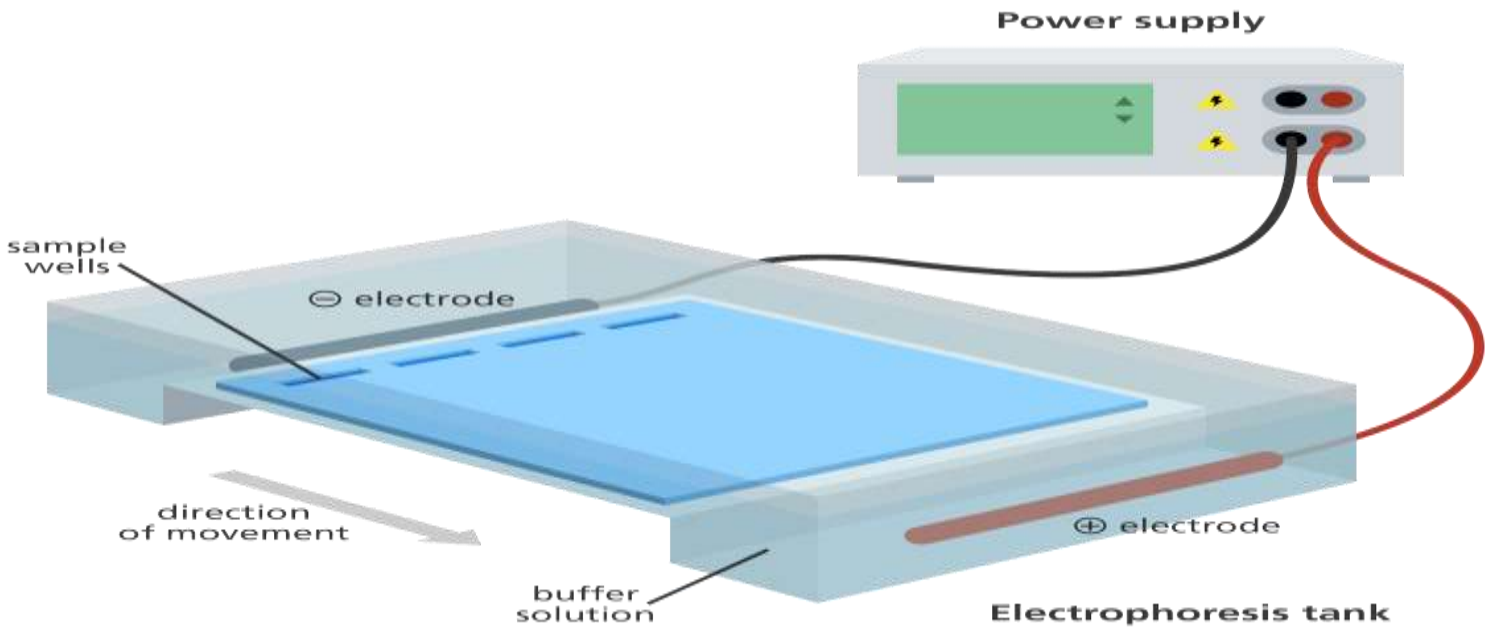

Fig. 4# Electrophoresis set up.

Forensic toxicology

- Forensic toxicology is the use of **toxicology** and other disciplines such as analytical chemistry, pharmacology and clinical chemistry to aid medical or legal investigation of death, poisoning, and drug use.
- **Toxicology.**

Is the "science of poisons". In other words toxicology is the study of toxic and irritant effects of chemicals on living organisms.

Classifications of poisons

According to forensic chemistry we can classify on the bases of following properties.

- Mode of action
- Physical state
- Medical classification
- Toxic-Analytical classification.

Mode of action

- According to mode of action we can classify the poisons just like. Corrosive poison .irritant poisons. Neurotic poisons. Etc
- **Irritant poisons.**

There are two types of irritant poisons

- **Inorganic poison.** Both metallic and no metallic poisons are involved in it.

Metallic. Lead, arsenic, mercury, antimony, bismuth ,
. silver, copper etc.

Non Metallic. Halides such as chlorides bromides,
. phosphates, sulphates. Nitrates, etc.

- **Organic poison.**

There are two types of organic poisons

Animal poisons. Snake venom. Scorpion venom.
. Cantharides etc.

- **Vegetable poisons.** Poisons is a huge class of poison.
. Which contains various plants which are toxic in nature,
- . For example croton, castor, caltrops, nuxvomica etc

Physical state

- Physical toxicants are substances that, due to their physical nature, interfere with biological processes.
- Examples include coal dust, asbestos fibers or finely divided silicon dioxide, all of which can ultimately be fatal if inhaled.
- Corrosive chemicals possess physical toxicity because they destroy tissues, but they're not directly poisonous unless they interfere directly with biological activity.

- Water can act as a physical toxicant if taken in extremely high doses because the concentration of vital ions decreases dramatically if there's too much water in the body.
- Asphyxiant gases can be considered physical toxicants because they act by displacing oxygen in the environment but they are inert, not chemically toxic gases.

Medical basis

- **Cardiac Poisons**
- Poisons acting on the heart, e.g. Digitalis, oleander, aconite, nicotine
- **Asphyxiants**
- These are the poisons acting on the lungs, e.g. carbon monoxide, carbon dioxide, war gas, sewer gas
- **Miscellanous**
- . Analgesics –aspirin, paracetamol
- . Anti-histamines
- . Anti-depressants –tricyclic compounds
- . Hallucinogens
- . Bacterial food poisoning
- . Stimulants -amphetamine

- Some **poisons** can be lethal if people breathe in their gas or vapor from the atmosphere.
- Examples include nitrogen peroxide, cyanogen and phosgene.
- Posions may be liquid, solid, paste or semi-solid.

Conclusion.

- Forensic chemistry has an effective importance in forensic science to solve a crime case
- .A chemist can help criminal justice system by using different methods and techniques of chemistry to prepare a forensic report.
- By use of above techniques we can solve any type of criminal case .like murder, suicide, fire explosives, drug smuggling etc.

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Thanks