Remaining Part of AAS

The **two most common methods** of sample atomization encountered in AFS,

a)Flame atomization

b)Electrothermal atomization

•Three specialized atomization procedures are also used

c) Glow-Discharge Atomization

d) Hydride Atomization

e) Cold-Vapor Atomization

We can discussed flame and electrothermal atomizer

a)Flame atomization It can take place by two types

1) Total consumption burner and 2) Premix burner

Total Consumption Burner/ Turbulent flow burner:

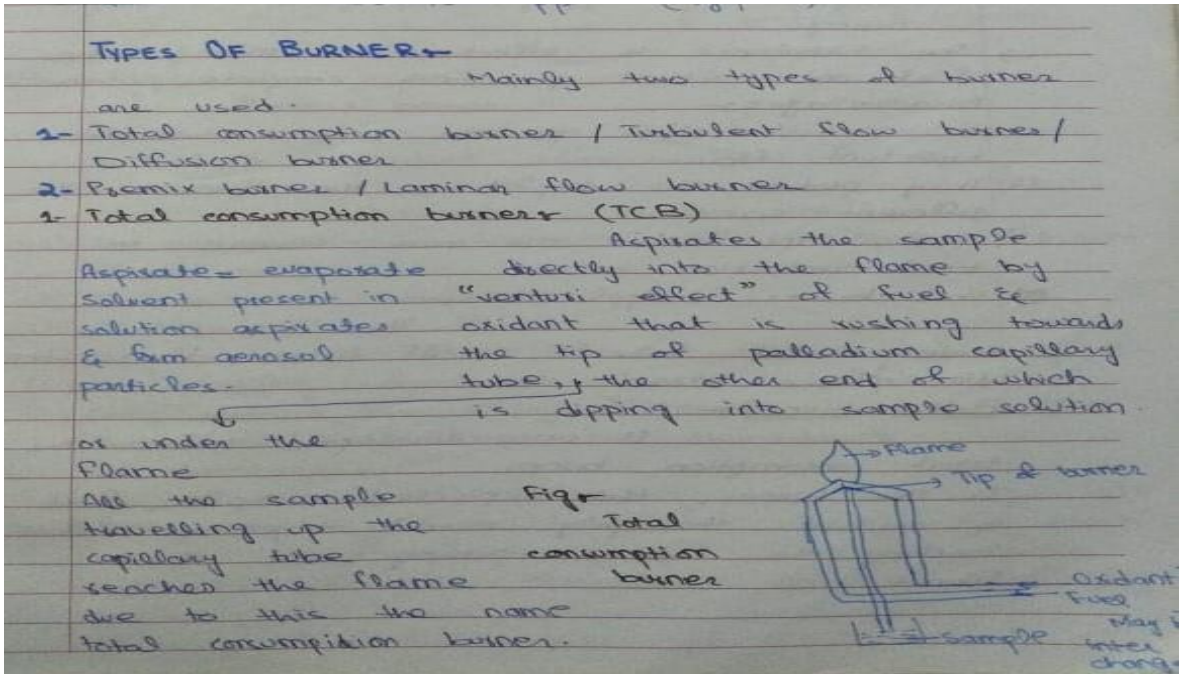


Fig TCB

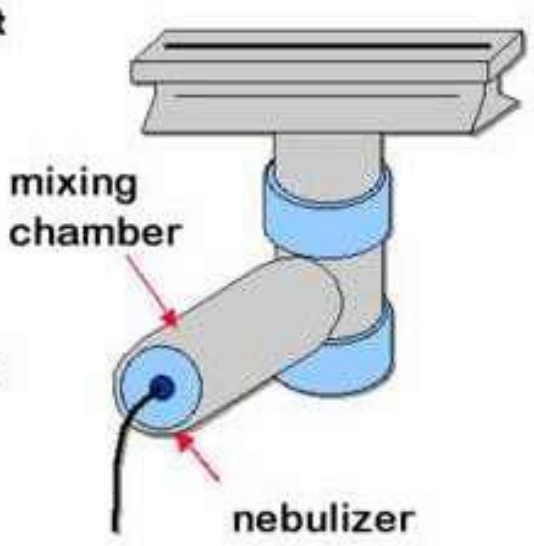
Premix Burner/Laminar Flow Burner

A flame atomizer will usually have a long, narrow burner head that serves as a sample path (b).

Sample is introduced via aspiration.

The nebulizer controls sample flow, producing a mist.

The mixing chamber assures that the sample mixes with the oxidant and fuel prior to entry into the flame.



Flame atomization

The most common fuel to use is acetylene.

Either air or nitrous oxide are used as oxidants, with N_2O producing a hotter flame.

	Temperature, °C
C_2H_2/Air	2100 - 2400
C_2H_2/N_2O	2600 - 2800

N_2O also tends to produce a noisier flame.

Date:

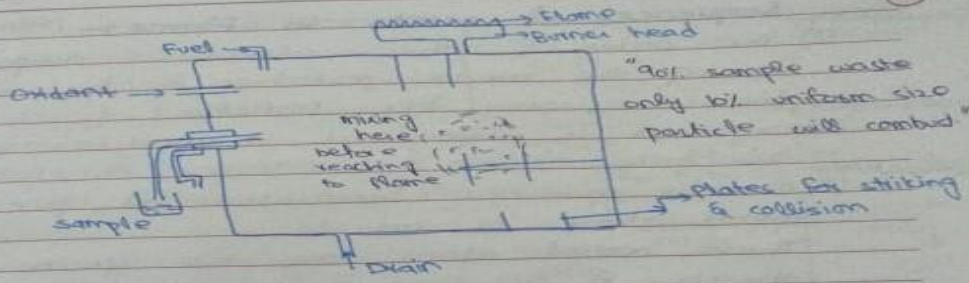


Fig:- Premix burner

Gases emerge in smooth & non-tibulence fashion hence it is called Laminar flow Burner.

Advantages:-

(1) Noiseless, smaller interference

(2) It produce stable flame while in TCB, turbulent flame produce

(3) It is non-turbulence.

(4) Mostly used in AAS.

(5) Its used in flame emission (FE) is advantageous.

(6) No clogging of burner.

(7) Only uniform fine spray of sample droplet reaches the flame. Large drops are drained off

Disadvantages:-

(1) Depending upon the flow rate of gases used and design of premix as much as 90% of sample may go down the drain and be wasted therefore loss of sensitivity

⇒ Sensitivity of Premix is greater than TCB.

⇒ Efficiency of TCB is more than TCB.

Working of Flame in Flame Atomizer:

In a flame atomizer, a solution of the sample is nebulized by a flow of gaseous oxidant, mixed with a gaseous fuel, and carried into a flame where atomization occurs. The following processes then occur in the flame.

•**Desolvation**: Solvent evaporates to produce a finely divided solid molecular aerosol.

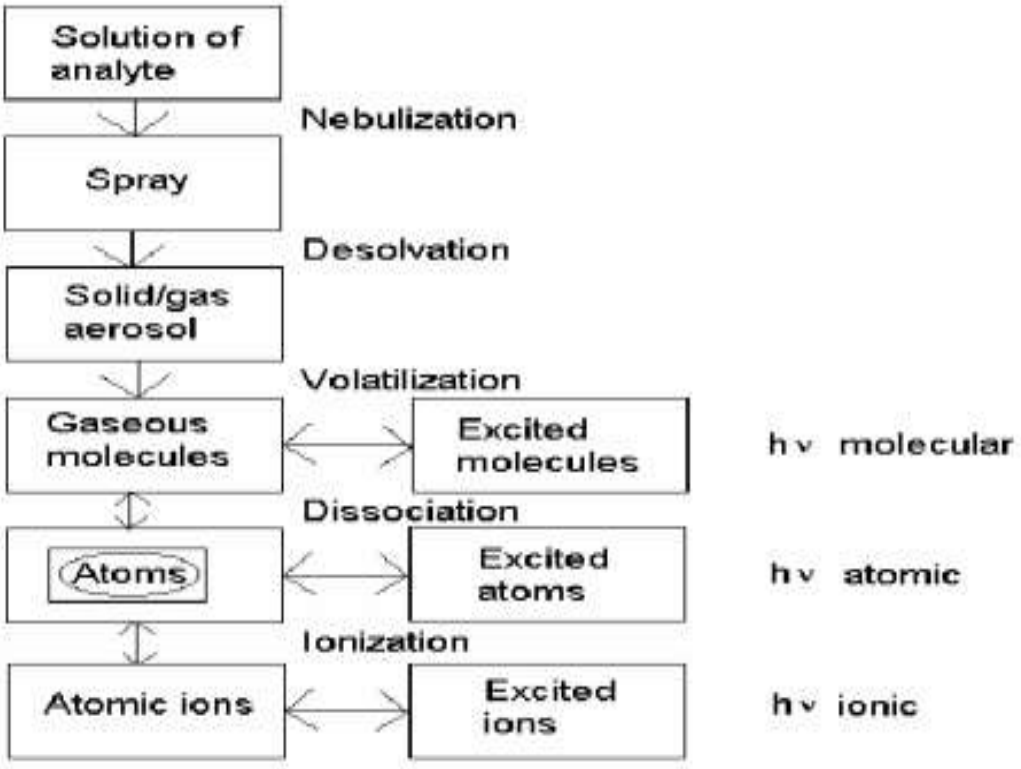
•The aerosol is then **volatilized** to form gaseous molecules.

• **Dissociation** (leads to an atomic gas)

• **Ionization** (to give cations and electrons)

• **Excitation** (giving atomic, ionic, and molecular emission)

These processes can be explained by Sketch Diagram



b) Electrothermal Atomization

An electrothermal atomizer is defined as a device which is heated to the temperature required for analyte atomization by the passage of electrical current through its body.

Advantages of Electrothermal Atomization

1)electrothermal atomizers offer the advantage of unusually high sensitivity for small volumes of sample.

2)Absolute detection limits lie in the range of 10-10 to 10-13 g of analyte.

3)The relative precision of electrothermal methods is generally in the range of 5% to 10% compared with the 1% or better that can be expected for flame or plasma atomization.

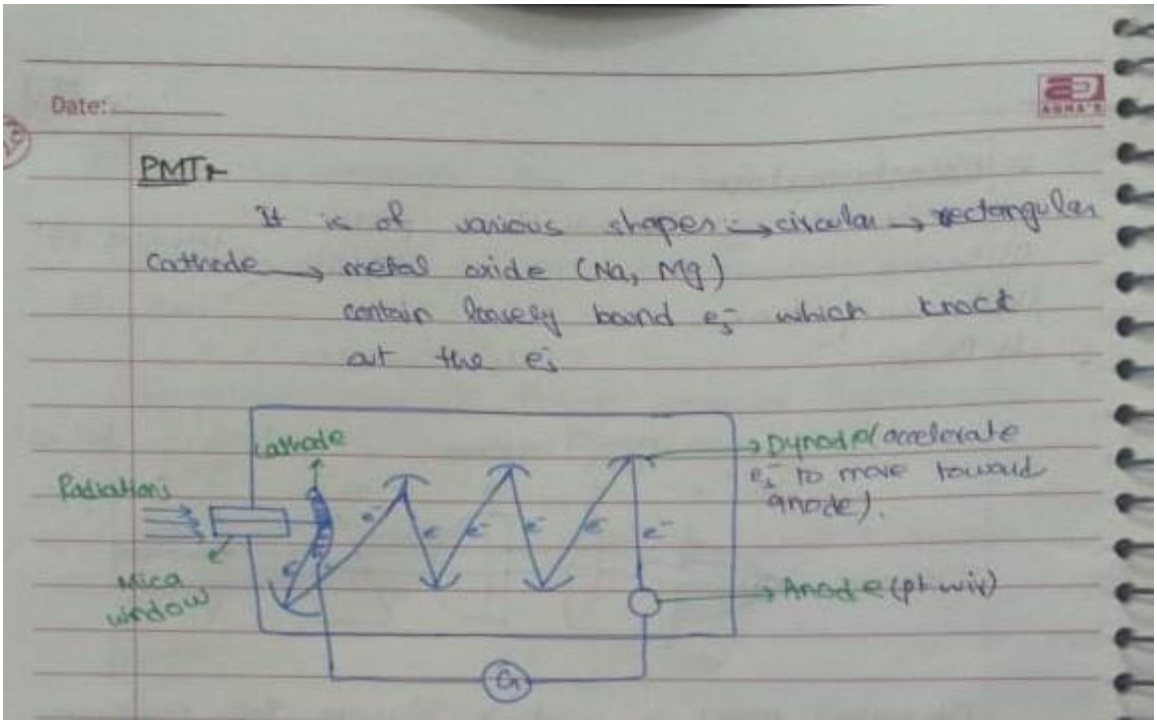
1) Monochromator:

In double beam spectrophotometer, usually gratings are used

- Usually UV/VIS grating monochromator
- its purpose is to isolate the resonance line of interest
- It separates the spectral line of interest from others
- Generally, most of the instruments are equipped with two gratings with the goal to cover a wavelength range from 189 to 851 nm which is used in atomic absorption.
- Use beam chopper to distinguish (only alternating signal is measured) two sources of radiation attenuated beam from lamp and excited atoms from the flame

2) Detectors:

Photomultiplier tube (PMT) - converts radiant energy into electrical signal.



3) Read out Device:

It read the signal and give information in the form of graph.