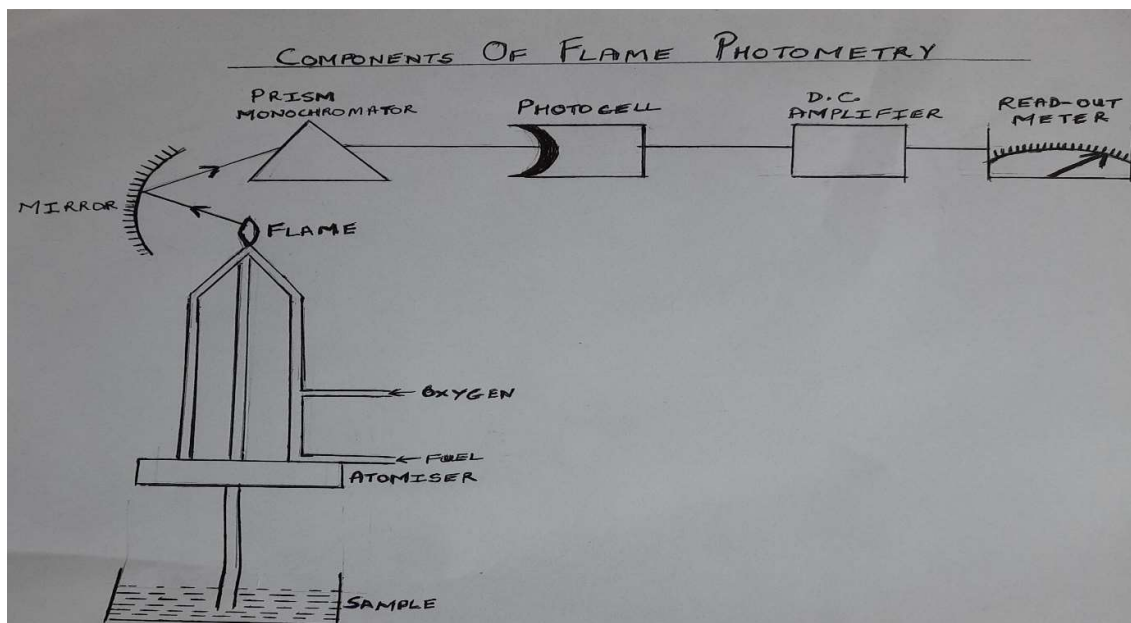


INSTRUMENTATION OF FLAME PHOTOMETRY:

Components of a flame photometer include;

- i) Burners
- ii) Mirror
- iii) Prism – Monochromator
- iv) Photocell
- v) Amplifier
- vi) Read –out meter



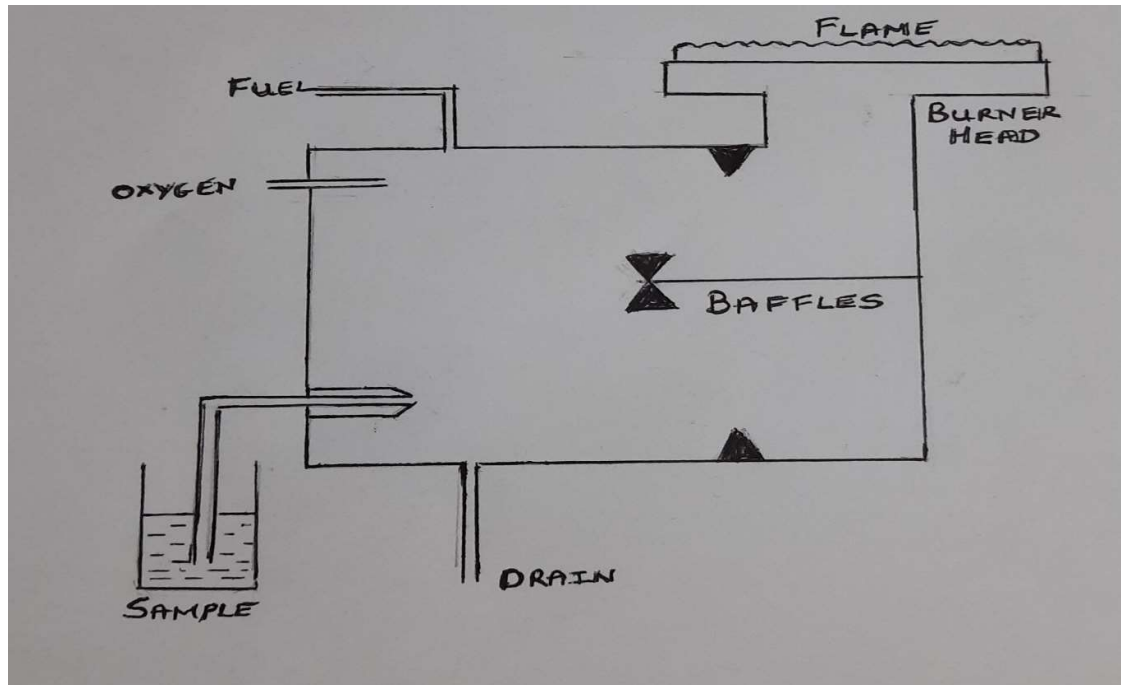
1. BURNER

BURNER: The flame produced in the burner is due to a fuel gas like hydrogen in the presence of an oxidant like oxygen.

The two types of burners are:

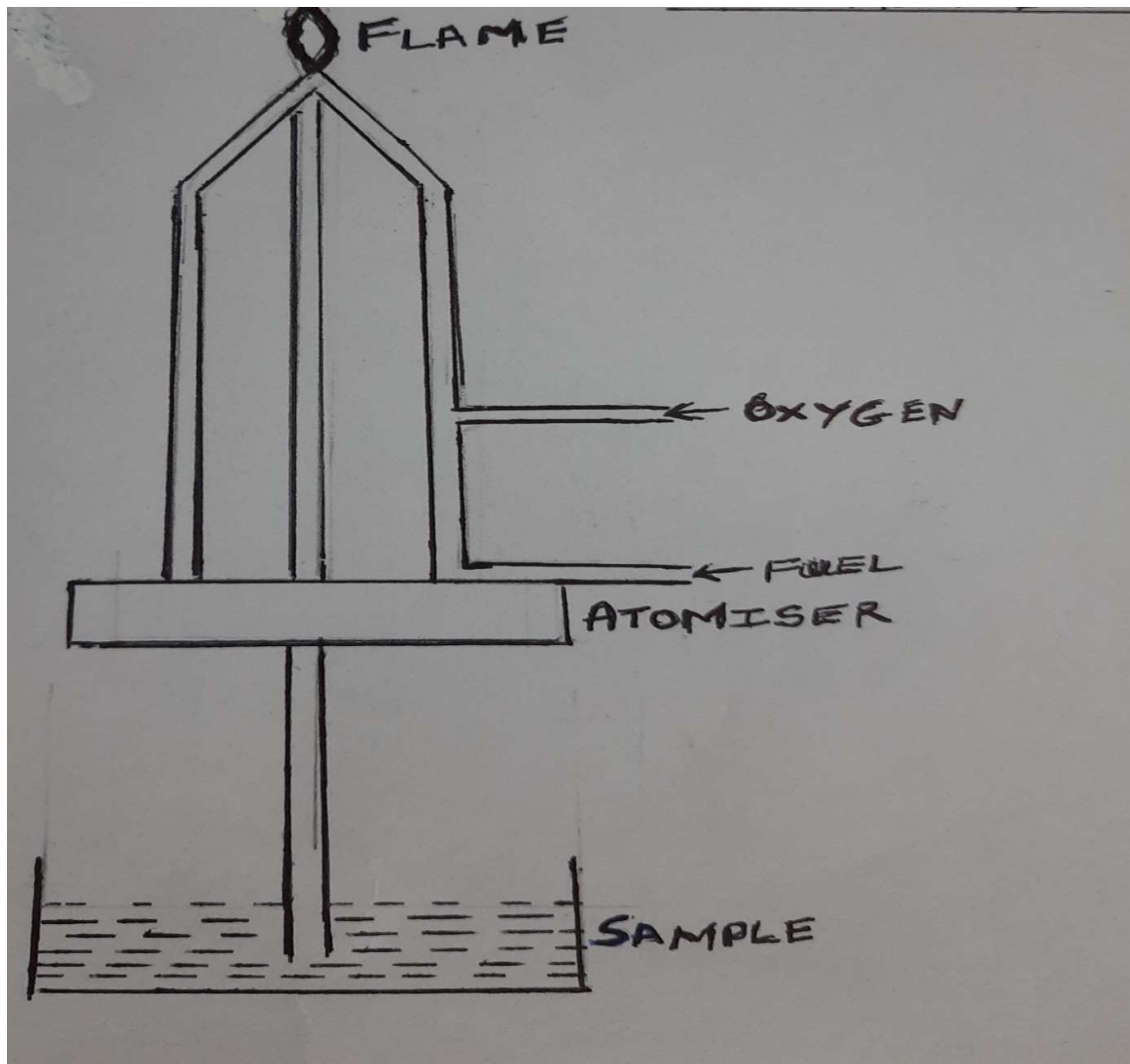
- a) Pre - mix burner and
- b) Total consumption burner

PRE – MIX BURNER



The fuel, oxidant and the liquid sample are thoroughly mixed before entering the flame hence it is known as pre – mix burner. Only the small droplets reach the flame. The large droplets are trapped by baffles and drained off. Hence 5% of the sample is introduced in the flame which produces efficient atomisation but emission intensity is weak. The flame produced is stable, non – turbulent, noiseless and large in cross-section.

TOTAL CONSUMPTION BURNER



The fuel gas burns in presence of oxygen to produce a flame.

The atomiser sucks the sample into the base of the flame producing tiny droplets. The oxygen aspirates the sample solution forming a solid residue. All the sample droplets irrespective of the size are evaporated hence it's known as Total Consumption burner. The flame produced is a noisy, turbulent and small in cross-section.

2.MIRRORThe beam from the flame is reflected by a concave mirror,placed behind the burner.The reflected beam is then sent into a filter or a monochromator.

3.FILTERWhen the reflected beam consists of a number of wavelengths ,then an optical filter is used.The filter allows the characteristic radiation of the element to enter to pass through but will absorb the other wavelengths.

e.g.For Sodium it allows wavelengths of 589 and 589.6 nm to pass through and not the others.

Each element requires a specific filter.Hence flame photometry can be used for detection of elements like Na ,K and Ca.

MONOCHROMATOR

Monochomator:If the reflected beam consists of a large number of wavelengths,a monochromator is used to disperse the reflected beam into individual wavelengths. This enables to detect several elements simultaneously.

Two types of monochromators are used i.e. prism and grating monochromator.

Prism monochromator consists of a glass or quartz prism which disperses the reflected light.

Grating monochromator is equally spaced parallel grooves on a flat surface.

A diffraction grating produces greater dispersion than a prism.

4.PHOTO CELLThe beam from the monochromator falls on the photocathode of the cell.The resulting current is amplified and its magnitude is read on the meter.

A photomultiplier tube may also be used.

The photomultiplier tube consists of several dynodes which are kept at fixed distances with increasing voltage. As the beam is incident on the dynodes, it is increasingly amplified.

5.AMPLIFIER :

The beam leaving the photocell may be further amplified by using a D.C. Amplifier. Hence when the signal reaches the read out meter it is thoroughly amplified and a good signal is obtained.

6.READ OUT METER The current from the amplifier is fed into the read out meter. A spectrum is obtained.

The magnitude of the electric current is directly proportional to the concentration of the emitting element.

The emission spectrum is recorded in a spectrometer consists of the characteristic emission lines. e.g. for Sodium the two yellow D-lines correspond to 589 nm and 589.6 nm.

The intensity of the emission lines is proportional to the concentration of the emitting element.