

- (b) This technique cannot be used very successfully for estimation of elements like Al , I , W , etc., because these elements give rise to oxides in the flame. However, the estimations can be done out under such conditions.
- (c) In aqueous solution, the dominant anion affects the signal to a negotiable degree.

13.8 Instrumentation

A schematic diagram of the atomic absorption spectrophotometer is shown in Fig. 13.2. The principle of the instrumentation is similar to other spectroscopic absorption methods.

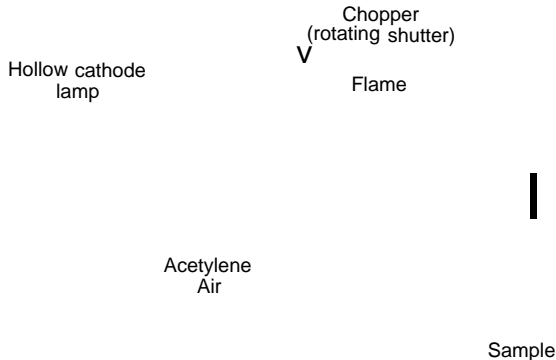


Fig. 13.2 : Schematic diagram for Atomic Absorption Spectroscopy.

The light of a certain wavelength (produced by a special kind of lamp), which is able to excite the atoms of the element whose concentration is to be determined, is passed through a flame containing the sample. The flame is maintained at a temperature which is sufficient to give the dry salt and then the vapour of the salt. The light which is absorbed by the sample is measured. The intensity of the light which is absorbed is proportional to the concentration of the element in the sample. The unabsorbed radiation from the flame is allowed to pass through a lens and a monochromator, which is used to select the wavelength of the light. The intensity of the light which is transmitted is measured. The difference in transmitted signal in the presence and absence of the test element is measured.

For all types of atomic absorption spectrometer, the following components are required:

1. Radiation source: The radiation source for atomic absorption spectrophotometer should be stable, intense radiation of a single wavelength, usually a resonance line of the element. The spectral lines should be narrow as compared with the width of the absorption band. These lines should not be interfered from other spectral lines which are not required for the measurement. There should be no general background or other extraneous lines emitting in the band pass of the monochromator. The problem of using such narrow spectral lines has been solved by adopting a hollow cathode lamp as the radiation source.

2. Hollow cathode lamp: The hollow cathode lamp is shown in Fig. 13.3. The cathode consists of a rod of the element which is to be determined. In this case, the cathode is made of the element whose concentration is to be determined. The cathode is placed in a tube containing an inert gas. The lamp is filled with a mixture of the element and an inert gas. The exact material depends upon the wavelength of the light which is to be transmitted. When a potential is applied between the two electrodes, the gas is ionized and the charged gas is attracted at high velocity towards the cathode.

