



### Atomic absorption spectroscopy (AAS):

#### Principle:

It is based on atomization of sample followed by absorption of radiation by ground state gaseous atoms. It can be done by the following steps.

Step: 1. Atomization of the sample.

Step: 2. The absorption of radiation from a light source by the free atoms.

Instrumentation:

#### Instrumentation:



Block diagram of Atomic absorption spectrophotometer.

#### 1.15.2. Components:

##### Radiation source:

The hollow cathode lamp is used as radiation source which provides constant intense beam of light. It consists of glass tube containing argon gas (Anode), Hollow cathode made of the analyte metal, is generally used.

##### Chopper:

A rotating wheel is placed between the hollow cathode lamp and the flame. It breaks the steady light from the flame into pulsating (Alternating) light (Because the recorder only records the alternating current)

##### Nebulizer:

It converts the liquid sample into smaller droplets.

##### Flame:

The flame is used for converting the liquid sample into gaseous molecule. It converts the molecule into atomic vapour. Two types of burners are used



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1. Total consumption burner
2. Pre mixed burner.

## **Filter:**

It is also called monochromatic. It select absorbing line from the spectral lines emitted from hollow cathode lamp and removes the scattered light of other wavelengths from the flame.

## **Detectors:**

It is also called photo multiplier tube. It converts the absorbed radiation into current.

## **Amplifier & recorder:**

The current from the detector is amplified and then recorded.

## **Working:**

The radiation obtained from the hollow cathode lamp is passed into the flame in which the sample is aspirated. The metallic compound decomposes to give atoms which absorb a part of radiation in the flame. The unabsorbed radiation in the flame is allowed to pass through the filter and then detector. Finally it is amplified and recorded. The above experiment is carried out using a series of standard solutions and the readings noted for each trial. Finally a graph of calibration curve is drawn between concentration verses absorbance. After finding out the absorbance of test solution experimentally, the concentration will be determined from the graph. Absorbance Concentration (ppm)

## **Applications:**

- It is used to determine the presence of metals like Ni, Fe, Cu, Al, Pb, Zn, etc in liquid samples.
- It is used to estimate the concentrations of metals in the samples of concentration range in the low mg/L range.
- It is used in pollution study.
- It is very useful in medical, biological and industrial fields.
- It is used to estimate Vanadium in lubricating oils.

## **Limitations:**

- It is necessary to use liquid samples.
- This technique is limited to only metals and metalloids



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