SNS COLLEGE OF TECHNOLOGY

Vazhiamyampalayam,Coimbatore-35

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DEPARTMENT OF CHEMISTRY

COURSE NAME : 19CHB101- CHEMISTRY FOR ENGINEERS

I YEAR / I SEMESTER

UNIT : 4. WATER AND INSTRUMENTAL ANALYSIS

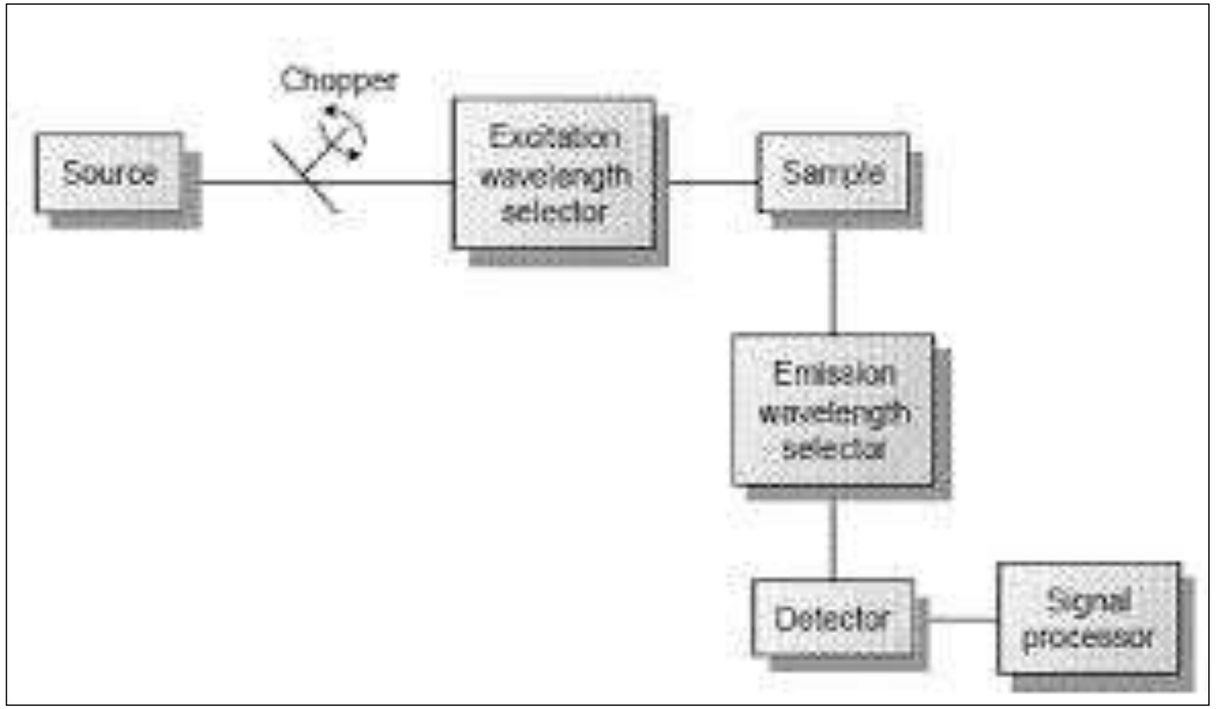
TOPIC : 7. ATOMIC ABSORPTION SPECTROSCOPY

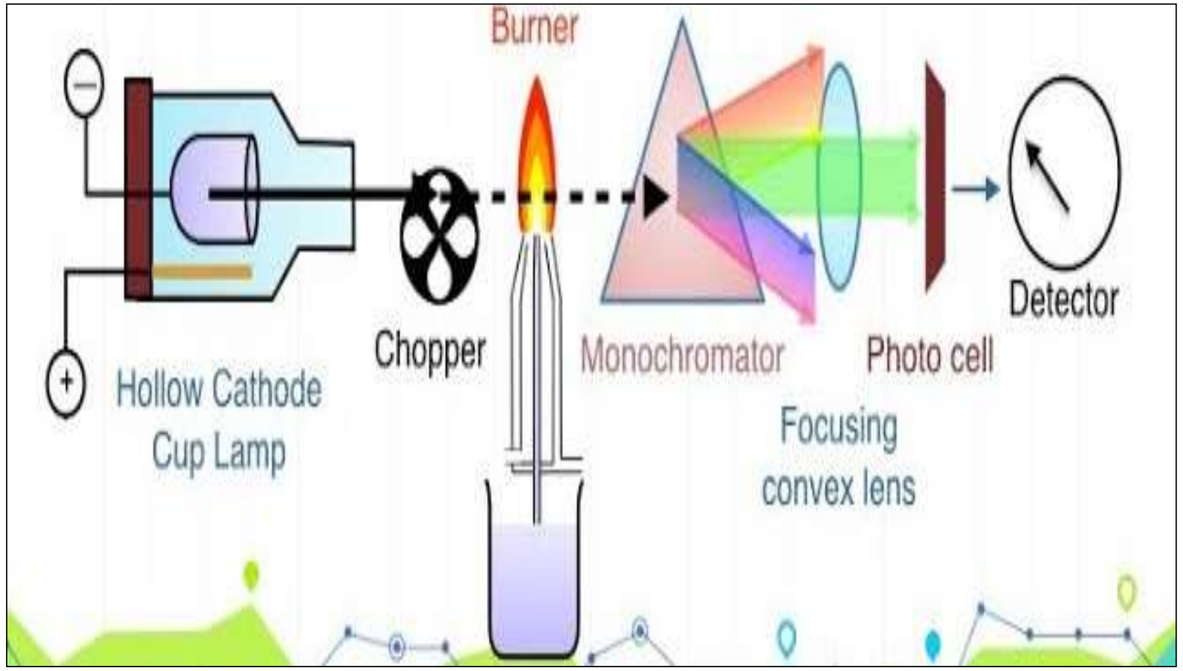
PRINCIPLE

- It is based on atomization of sample 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.

- It is used to determine the presence of metals like Ni, Fe, Cu, Al, Pb, Zn, etc in liquid samples.
- It is also used to measure the concentrations of metals in the samples of concentration range in the low mg/L range.

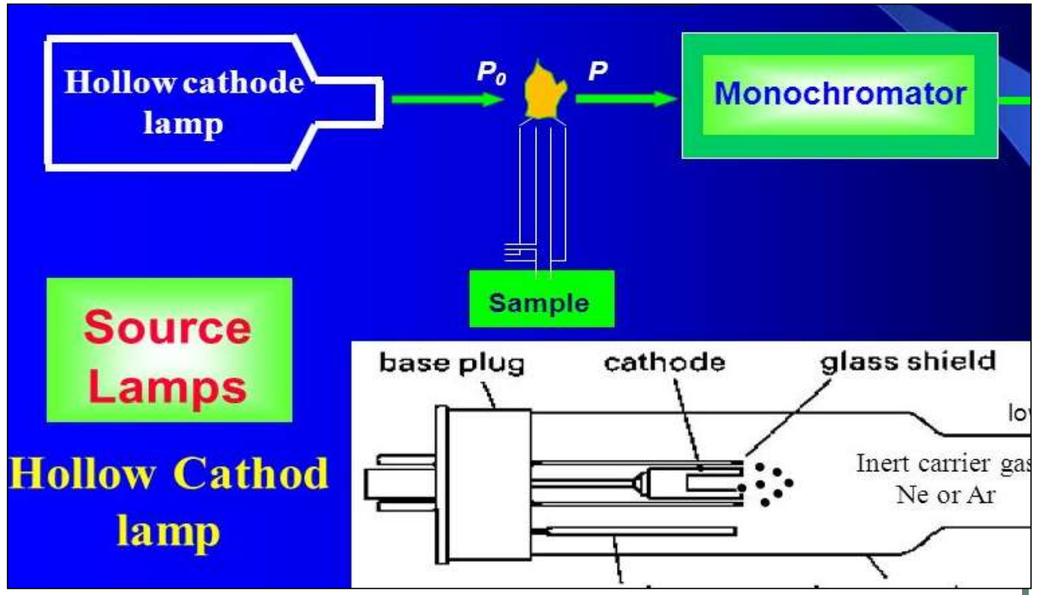
BLOCK DIAGRAM

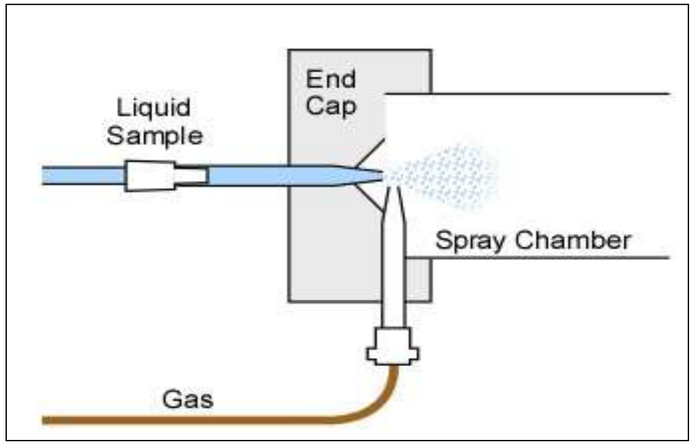




COMPONENTS

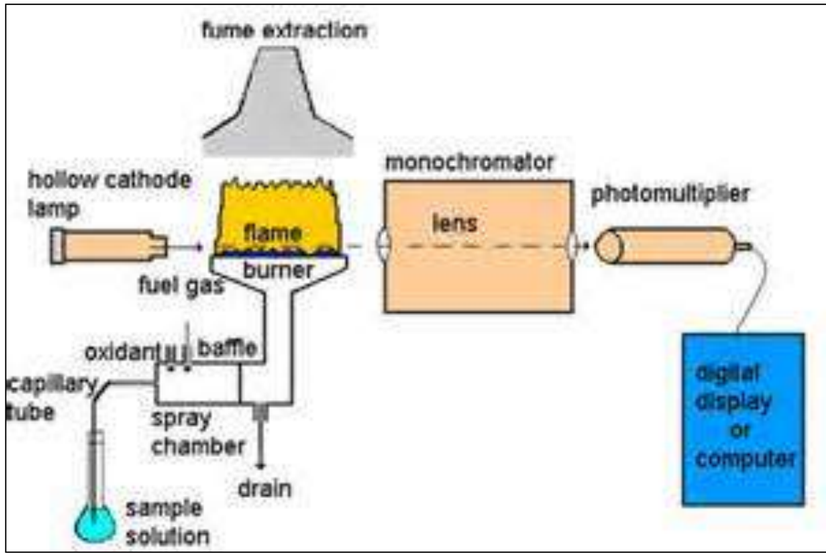
- **1. Radiation source**:
- The hollow cathode lamp is used as radiation source which provides constant intense beam of light.
- **2.Chopper:**
- A rotating wheel is placed between the hollow cathode lamp and the flame.
- It breaks the steady light.
- **3.Flame:**
- It is used for converting the liquid sample into the gaseous state.It converts the molecule into atomic vapour.Two types of Burners used.1.Total consumption burner 2.Premixed burner.





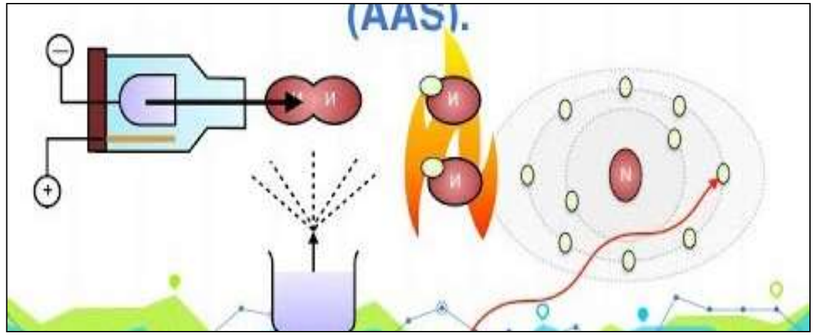
COMPONENTS

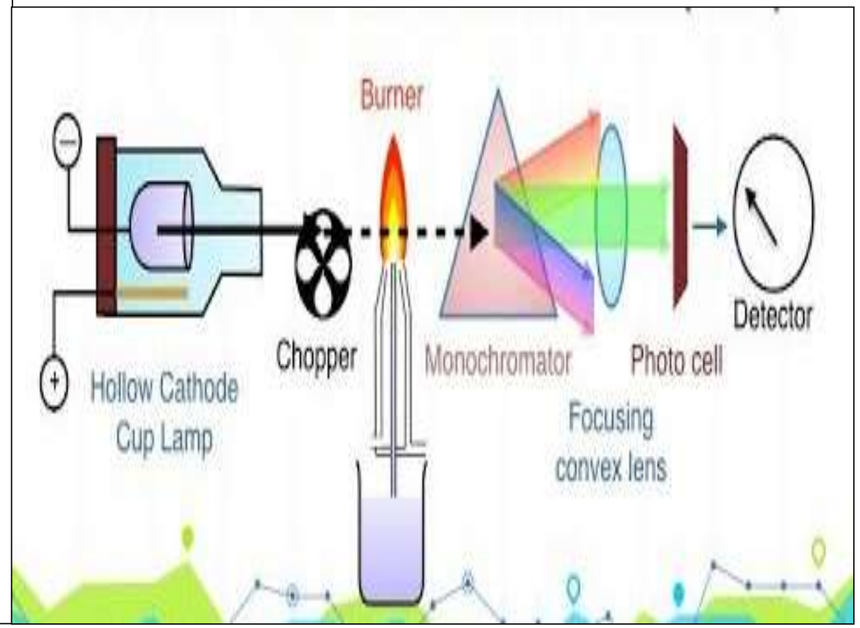
- **4.Nebulizer:**
- It converts the liquid sample into atomic vapour.
- 5.**Filter:**
- It is also called monochromator.
- It select absorbing line from the spectral lines emitted from hollow cathode lamp and removes the scattered light of other wavelengths from the flame.
- **6.Detectors:**
- It is also called photo multiplier tube. It converts the absorbed radiation into current.
- **7.Amplifier & recorder**:
- The current from the detector is amplified and then recorded.



WORKING

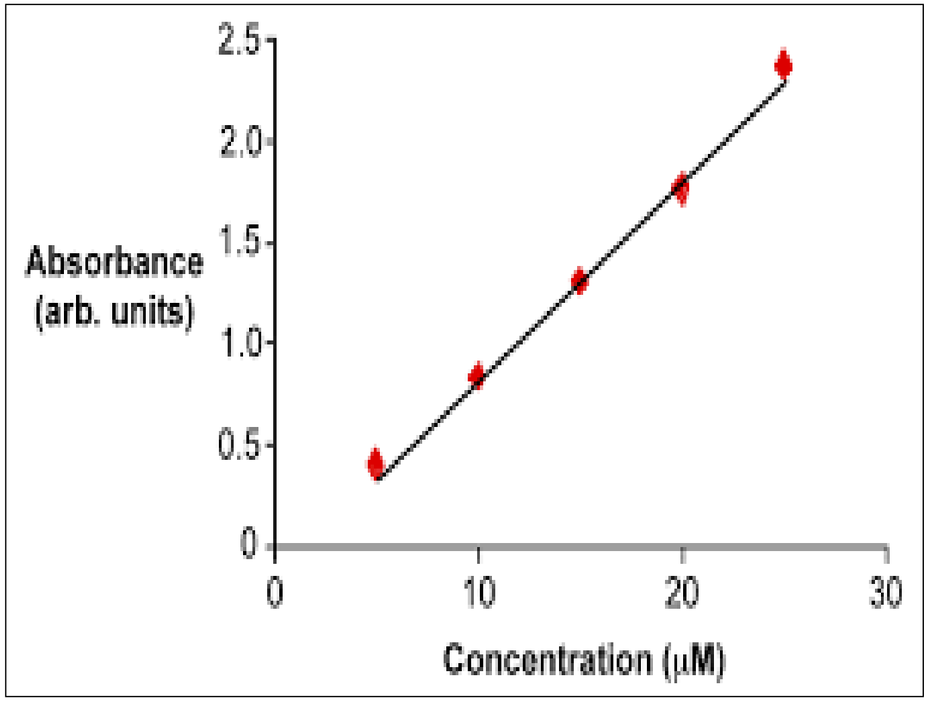
- The radiation obtained from the hollow cathode lamp is passed into the flame in which the sample is aspirated.
- The metallic compound decomposes to give atoms which absorb a part of radiation in the flame.
- The unabsorbed radiation in the flame is allowed to pass through the filter and then detector.
- 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.





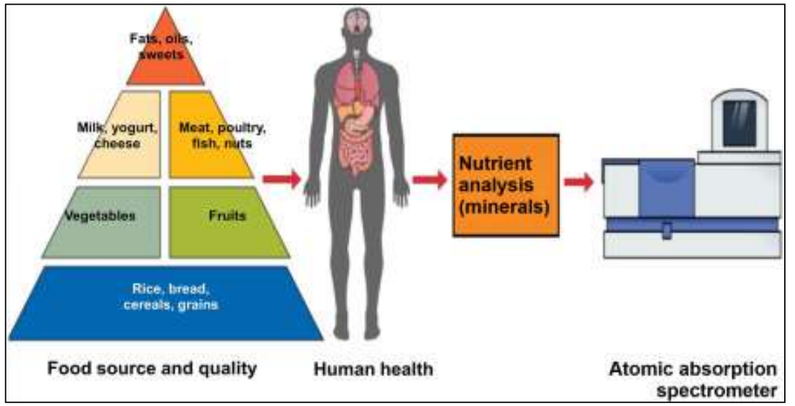
WORKING

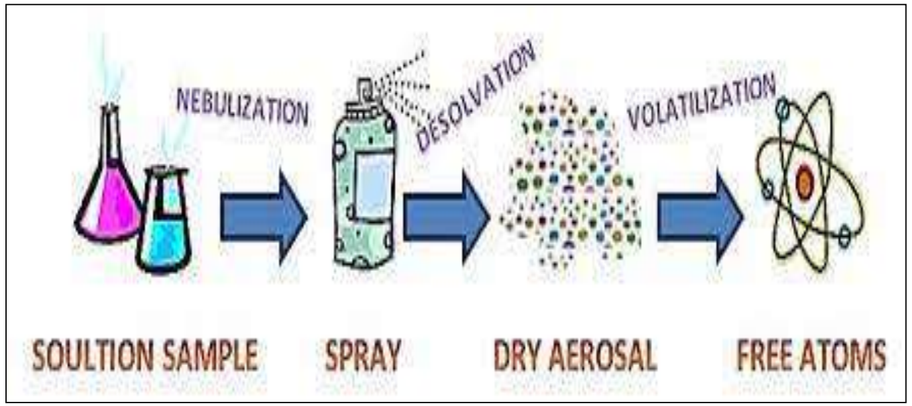
- Finally a graph of calibration curve is drawn between concentration verses absorbance.
- It gives a straight line satisfying Beer – Lambert's law.
- After finding out the absorbance of test solution experimentally, the concentration will be determined from the graph.
- Absorbance Concentration (ppm)



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

ASSESSMENT

1. List out the various components used in AAS

2. Draw a block diagram for the AAS.

REFERENCES

1. O.G. Palanna, “Engineering Chemistry ”Tata McGraw-Hill Pub. Co. Ltd, New Delhi.2017.
2. Wiley, “Engineering Chemistry”, John Wiley & Sons. InC, USA.
3. P.C.Jain & Monicka Jain, “Engineering Chemistry” , Dhanapat Rai Publising Company Pvt. Ltd. 2017.

THANK YOU