Department of Anesthesia Techniques
Title of the lecture:- Flame Photometry

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Flame Photometry

Flame photometry (more accurately called Flame Atomic Emission Spectrometry)is a branch of spectroscopy in which the species examined in the spectrometer are in the form of atoms A photoelectric flame photometer is an instrument used in inorganic chemical analysis to determine the concentration of certain metal ions among them sodium, potassium, calcium and lithium. Flame Photometry is based on measurement of intensity of the light emitted when a metal is introduced into flame. - The wavelength of color tells what the element is (qualitative) - The color's intensity tells us how much of the element present (quantitative).

The basic principle upon which Atomic Spectroscopy works is based on the fact that "Matter absorbs light at the same wavelength at which it emits light". Atoms of elements → subjected to hot flame → specific quantum of thermal energy absorbed by orbital electrons → become unstable at high energy level → release energy as photons of particular wavelength → change back to ground state. When a metal salt solution is burned, the metal provides a colored flame and each metal ion gives a different colored flame. Flame tests, therefore, can be used to test for the absence or presence of a metal ion.

BASIC CONCEPT:

Liquid sample containing metal salt solution is introduced into a flame, Solvent is first vaporized, leaving particles of solid salt which is then vaporized into gaseous state Gaseous molecule dissociate to give neutral atoms which can be excited (made unstable) by thermal energy of flame The unstable excited atoms emit photons while returning to lower energy state The measurement of emitted photons forms the basis of flame photometry.

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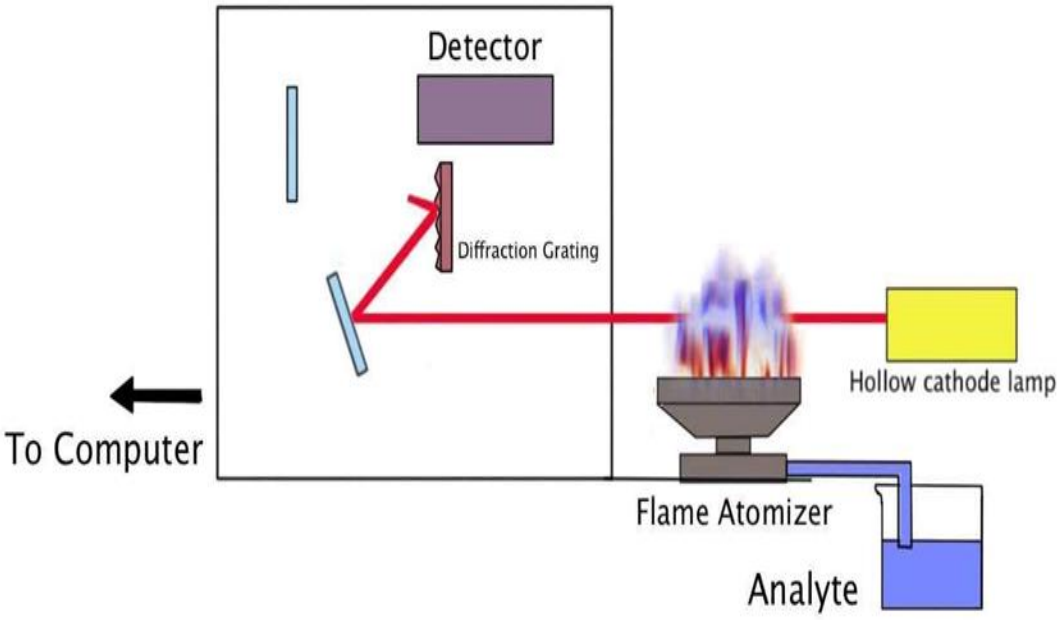
The light intensity of the characteristic wavelength produced by each of the atoms is directly proportional to the number of atoms that are emitting energy, which in turn is directly proportional to the concentration of the substance of interest in the sample. Various metals emit a characteristic color of light when heated.



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APPLICATIONS:

• To estimate sodium, potassium, calcium, lithium etc. level in sample of serum, urine, and other body fluids.

• Flame photometry is useful for the determination of alkali and alkaline earth metals.

• Used in determination of lead in petrol.

• Used in determination of calcium and magnesium in cement.