Inas Qasim

Spectrophotometer

It is an instrument that measures the amount of photons (intensity of light) absorbed after it passes through sample solution. In the spectrophotometer, the concentrations of a known chemical substance can be determined by measuring the intensity of light detected depending on the range of wavelength of light source.

Types of Spectrophotometer:

1-UV-visible spectrophotometer: uses light of the ultraviolet range (185 - 400 nm) and visible rang (400 - 700 nm) of electromagnetic radiation spectrum.

2- IR spectrophotometer: uses light of the infrared range (700 - 15000 nm) of electromagnetic radiation spectrum.

Parts Of Spectrophotometers:

1- Photocell : convert the light into electrical current .

2- Prism or granting (monochrometer) : it will analyze the light to selected spectra and wavelength .

3-Wavelength (knob) : to control the certain wavelength applied .

4-Cuvatte and sample holder .

5- Galvanometer : it will measure the electrical current from photocell or detector .

6- Zero point adjustment : it is to set up the equipment

to the zero point before use .

Parts of photocells :

1-Red photocell (600 – 800) nm.

2- Blue photocells (400 – 495)nm.

Source of light :

1- Tungsten filament : The most commonly used source for visible light ranging from (400 – 700) nm.

2- Halogen lamp : It will give more bright light with minimum of the red and has a long life in use .

3-Deuterium lamp : It will use in ultraviolet spectra measurement ranging(190 – 400) nm .

Diffraction Grating :

It is an optical device consisting of many closely spaced parallel slits or grooves.

Prism :

It is An object made up of a transparent material like glass or plastic that has at least two flat surfaces that form an acute angle (less than 90 degrees).

Photometer Spectrophotometer:

photometer	spectrophotometer

1-It use filter which give approximate a wavelength according to the color	1-It use prism or grating (monochrometer) which give exact wavelength
2-Lower cost.	2-More expensive, but may be necessary
3-Smaller number of calibrations	3-Unlimited number of calibrations
4-Fixed applications	4- coverage accommodates new processes
5-Simpler chemistries	5-More complex chemistries

Flame photometer

It a device used for the determination of electrolytes in a given solution. It is most commonly used for the quantitative analysis of sodium (Na) and potassium (K) ions in body fluids. It used for measuring the wavelength specific for (K , Na) by special filter depending on intensity and emission light.

Parts of a flame photometer :

1-Source of flame :A burner that provides flame and can be maintained in a constant form and at a constant temperature.

2-Nebuliser and mixing chamber : Helps to transport the homogeneous solution of the substance into the flame at a steady rate and it has three inputs .

3-Optical system (optical filter): The optical system comprises three parts: convex mirror, lens and filter.

4 -Photo detector: Detect the emitted light and measure the intensity of radiation emitted by the flame.

There are two types of atomizers burner:

1- Total consumption burner : It is draws the solution directly into the base of small flame where it is vaporized burned and locally droplets of fluid to the flame.

2-A premix burner: The large droplets full the floor of the chamber and only the rare fine droplets are carried up word into the flame by the flow of gas.

Flame photometer emission wavelength:

Flame Color	Emission wavelength (nm)	Element
Yellow	589	Sodium (Na)
violet	766	Potassium(k)
Lime Green	554	Barium(Ba)

Orange	622	Calcium(Ca)
Red	670	Lithium(Li)