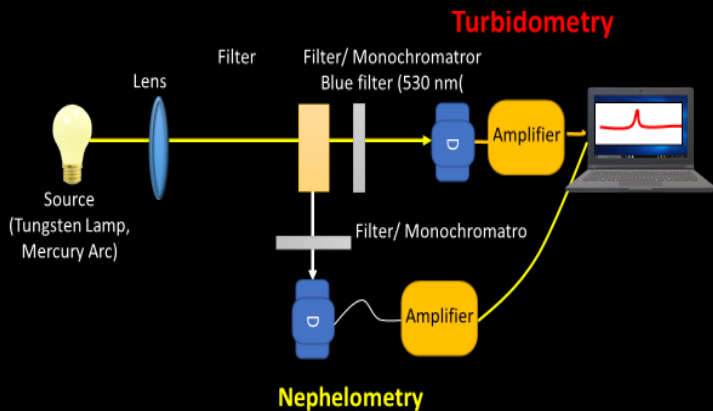


Nephelo-Turbidometry

- ✓ Basic Introduction
- ✓ Principle
- ✓ Instrumentation
- ✓ Applications



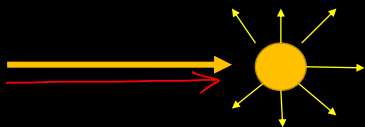
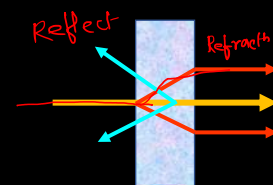
Spectroscopy
Instrumental Analysis

Nephelo-Turbidometry



Introduction:

- When a EMR or Light passes through a moderately stable suspensions, a portion of incident radiant energy is degenerated by the Absorption, Refraction, and Reflection and remaining portion of light gets transmitted. ✓
- The Suspension particles have property scattering of light is termed as the Tyndall effect
- Scattering of Light- changes the direction of light in multiple plane without changes in net radiating power of energy

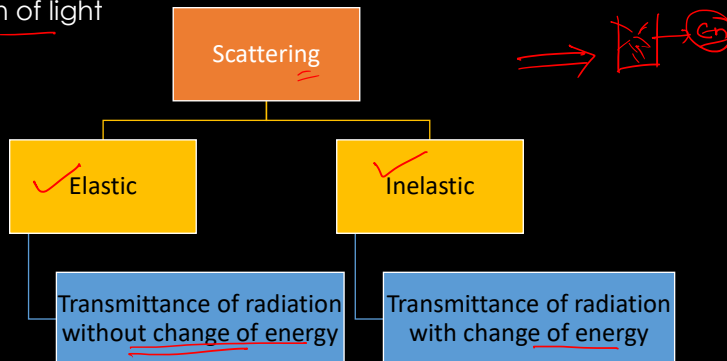
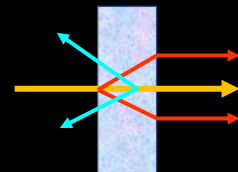


Nephelo-Turbidometry



Introduction:

- Scattering of Light- changes the direction of light in multiple plane without changes in net radiating power of energy
- Scattering depends- a) No of Particles, b) Dimension of particles, and c) wavelength of light

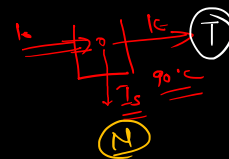


Nephelo-Turbidometry



Introduction:

- Nephelometry** (Greek Word, Nephela-meas cloud) is the measurement of elastic scattering light as the function of concentration of the suspended particles (<100 mg/L, Low Conc), measured at 90°
- Turbidometry**-is the measurement of transmitted light as the function of concentration of the suspended particles (>100 mg/L, high conc), measured at 80°



Nephelo-Turbidometry



Principles:

Nephelometry (Greek Word, Nephel-meas cloud) is the measurement of **scattering light** of the suspended particles perpendicular (90°) to incident light. It can also be measured at any convenient angle 45°, 60°, 135°, etc

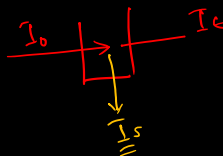
$$I_s = K_s \times I_o \times C$$

K_s - Constant ✓

I_o - Intensity of incident light ✓

I_s - Intensity of Scattered light ✓

C - concentration of suspension ✓



Nephelo-Turbidometry



Principles:

Turbidometry ~~Turbidometry~~ is the measurement of **transmitted light** or light scattering effect of suspended particles at 180° to incident light.

$$T = (1/L) \times L \times n \times (I_o/I_t)$$

T - Turbidity ✓

I_o - Intensity of incident light

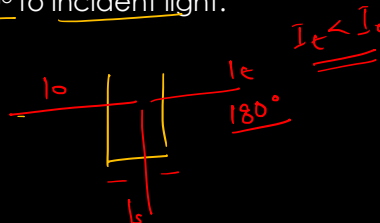
I_t - Intensity of transmitted light

L - length of dispersion

n - refractive index of dispersion media

**It is the function of concentration ($I_t \propto 1/C$)

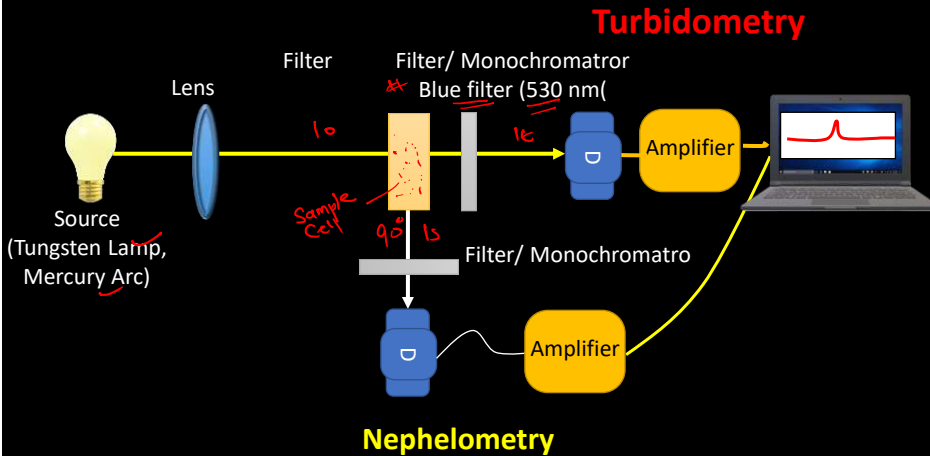
$$T = n \frac{I_o}{I_t}$$



Nephelo-Turbidometry



Instrumentation:

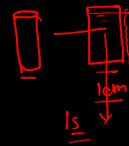


Nephelo-Turbidometry



Instrumentation:

- **Source of light**- Tungsten lamp (used for polychromatic light) ✓
 Mercury arc lamp (used for monochromatic light) ✓
- **Filter/Monochromator**- Used only when monochromatic light is required. In turbidometry, a blue filter (530 nm) is used and in Nephelometry the visible filter is applied as secondary filter.
- **Sample Cell**- Cylindrical or Rectangle made-up of glass, 1cm path length, cells are coated with black to avoid any reflection that may affect detector response. Specialized cell to use measure the scattered light at different desired angle, mostly used 90° ✓
- **Detector**- Photovoltaic cells, Phototubes, - Turbidometry ✓
 Photomultiplier tubes - Nephelometry ✓



Nephelo-Turbidometry



Application:

- ☑ **Analysis of water-** Clarity of water, determination of ions/minerals conc.
- ☑ **Determination of Carbon dioxide-** The sample gas is passed through barium salt, precipitated as barium carbonate, and is determined by Nepheloturbidometry
- ☑ **Determination of Inorganic substance-** by using precipitant inorganic element/ions like P, Cl, CO₃, F, CN, Ca, Zn, etc can be precipitated and the turbidity or opalescence can be measured

Analyte	Reagent/Precipitant	Precipitate
P ✓	Strychnine Molybdate	-
Ca ✓	Oxalate salt ✓	Ca oxalate
Zn	Pot. Ferrocyanide	Zn ferrocyanide
CN	Silver salt	AgCN
CO ₃	BaCl ₂	BaCO ₃

Nephelo-Turbidometry



Application:

- ☑ **Titrimetric analysis-** Titrant and Titrate give the turbid product which can be analyze.
- ☑ **Assay of Antibiotics-**

Antibiotics	Microorganism	Media pH	Phosphate buffer pH	Potency of solution	Incubation temp (°C)
Doxycycline ✓	Staphylococcus aureus ✓	7 ✓	4.5 ✓	0.003-0.01	35-37 (°C) ✓
Gentamycin	Staphylococcus aureus ✓	7 ✓	8 ✓	0.6-1.25	35-37 ✓
Streptomycin	Klebsilla pneumoniae	7 ✓	8 ✓	2.4-3.8	35-37 ✓



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