Spectroscopy-1

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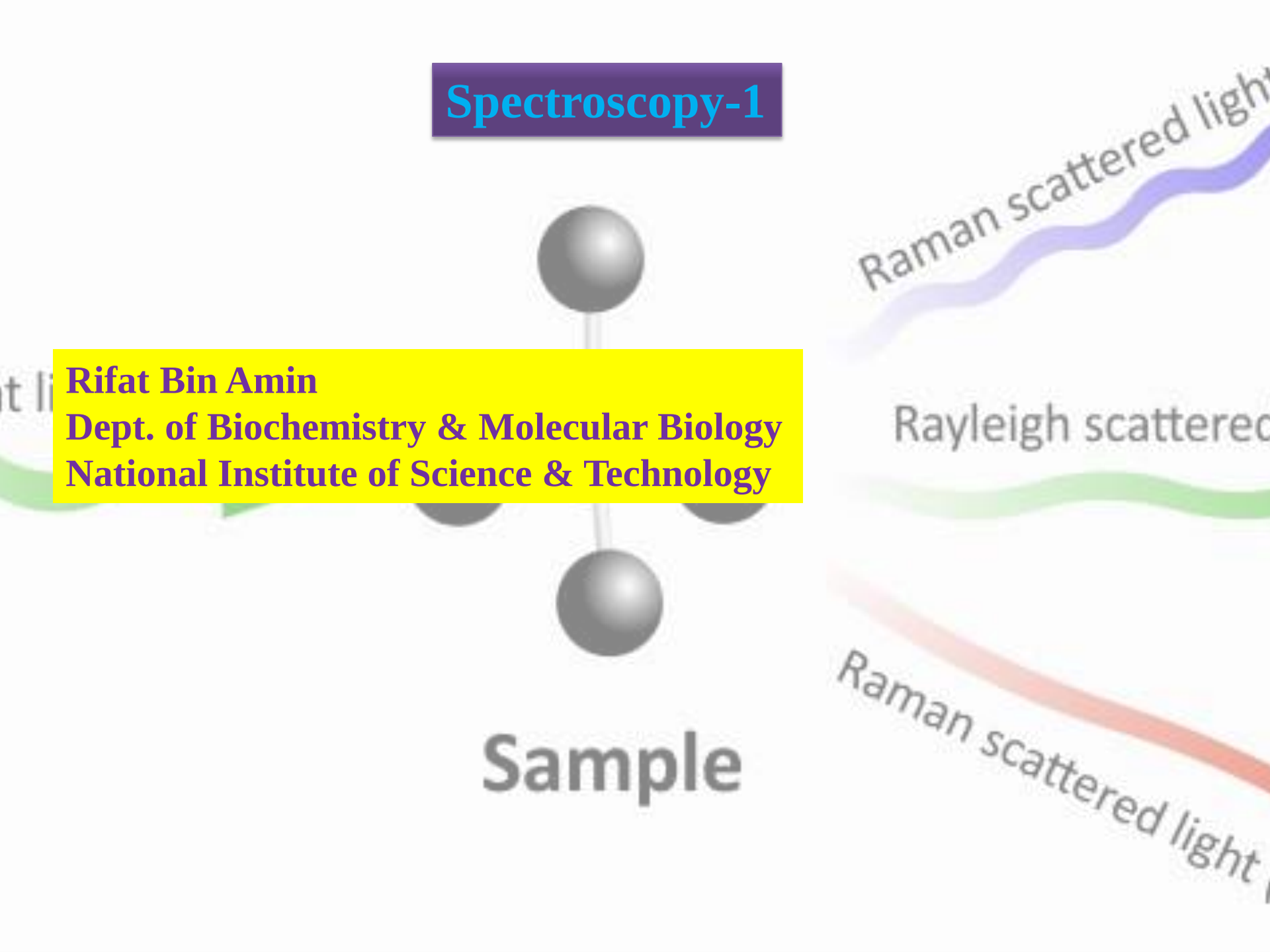
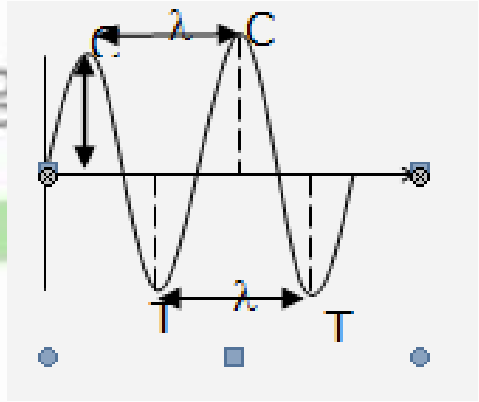
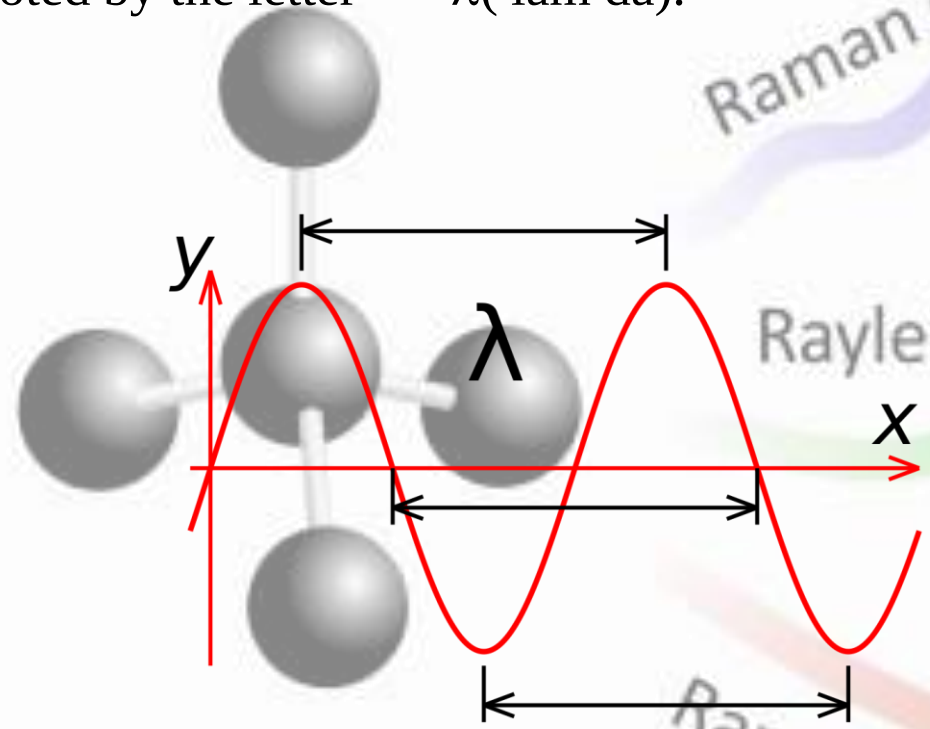


Wavelength (λ)

It is the distance between the two adjacent crests (C-C) or troughs (T-T) in a particular wave. It is denoted by the letter λ(lam da).



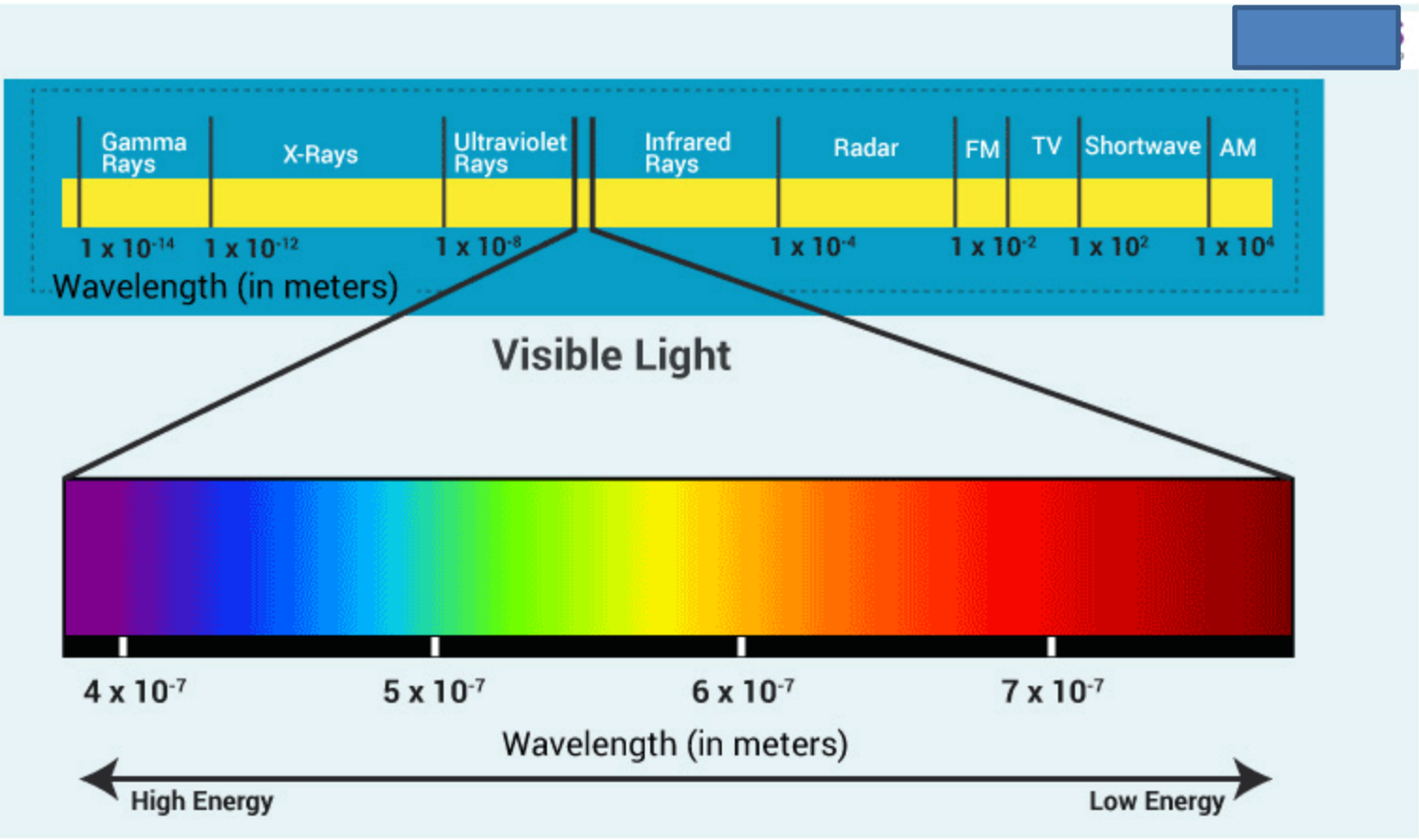


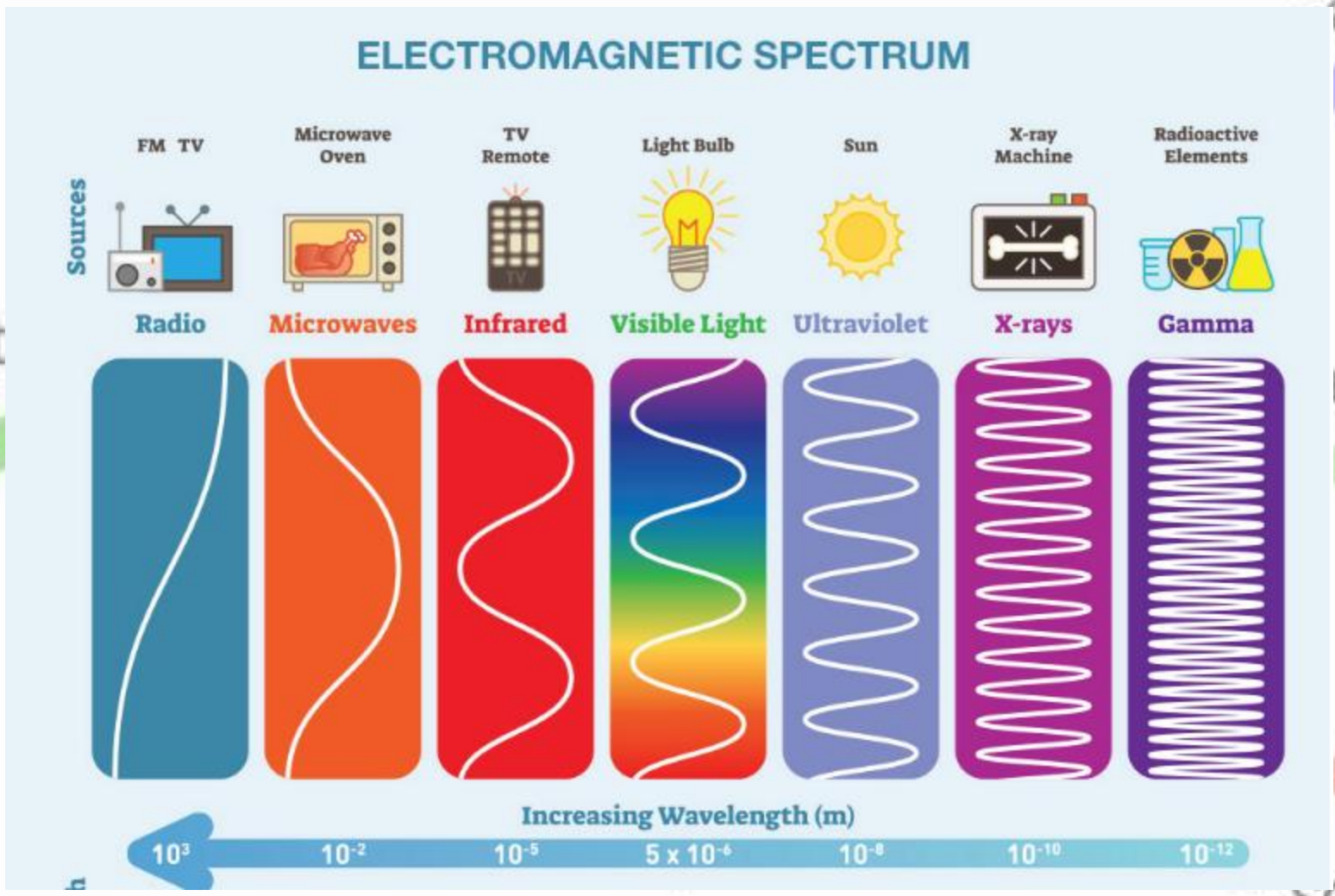
Units used for wave length are :

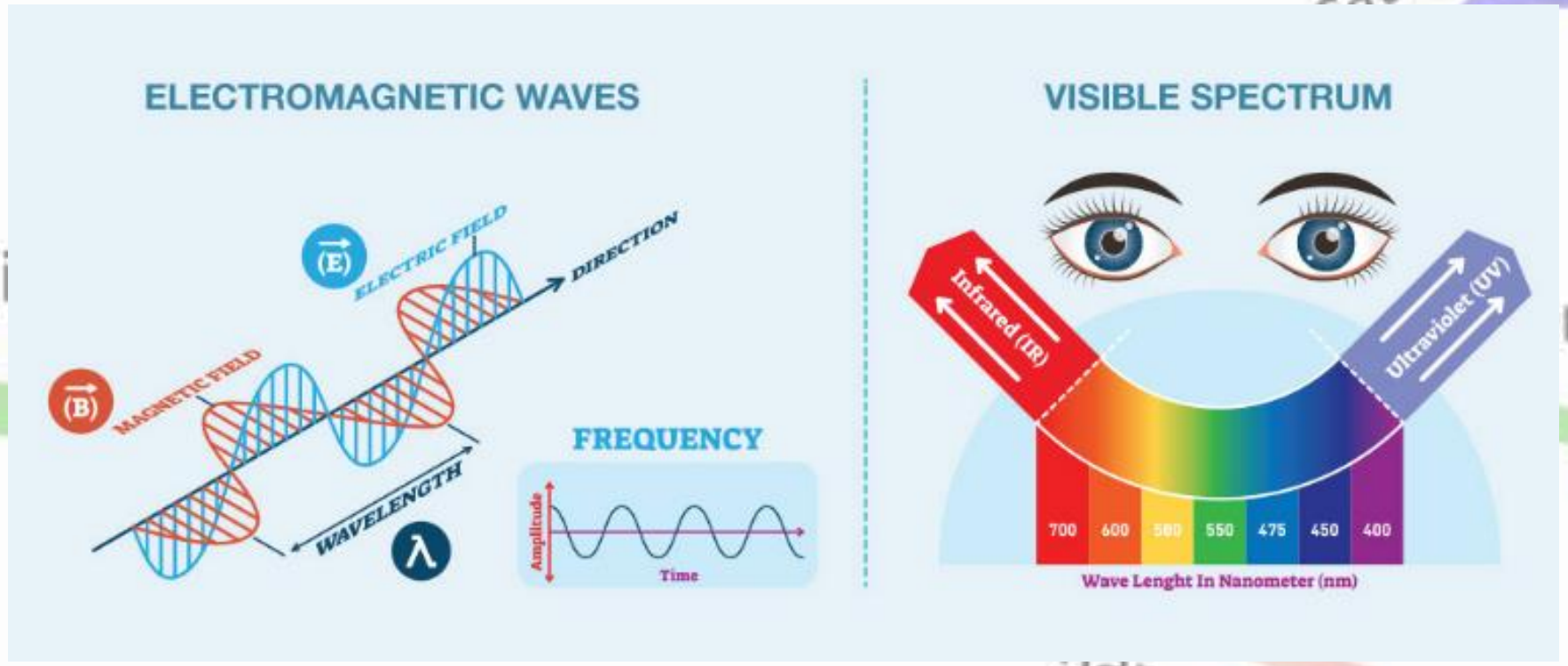
Angstrom(A^0) = 10^{-10}m = 10^{-8} cms

Micrometer (μm) = 10^{-6}m

Nano meter (nm) = 10^{-9}m


Gamma Rays
X-Rays
Ultraviolet Rays
Infrared Rays
Radar
FM
TV
Shortwave
AM
1 x 10-14
1 x 10-12
1 x 10-8
1 x 10-4
1 x 10-2
1 x 102
1 x 104
Wavelength (in meters)
Visible Light
4 x 10-7
5 x 10-7
6 x 10-7
7 x 10-7
Wavelength (in meters)
High Energy
Low Energy


ELECTROMAGNETIC SPECTRUM
Sources
FM TV
Microwave Oven
TV Remote
Light Bulb
Sun
X-ray Machine
Radioactive Elements
Radio
Microwaves
Infrared
Visible Light
Ultraviolet
X-rays
Gamma
Increasing Wavelength (m)
10³
10⁻²
10⁻⁵
5 x 10⁻⁶
10⁻⁸
10⁻¹⁰
10⁻¹²


ELECTROMAGNETIC WAVES
(E)
ELECTRIC FIELD
DIRECTION
(B)
MAGNETIC FIELD
WAVELENGTH
λ
FREQUENCY
Amplitude
Time
VISIBLE SPECTRUM
Infrared (IR)
Ultraviolet (UV)
700
600
580
550
475
450
400
Wave Lenght In Nanometer (nm)

Frequency (ν)

Frequency may be defined as the number of waves which can pass through a point in one second (i.e. number of vibrations in unit time) of an electromagnetic radiation.

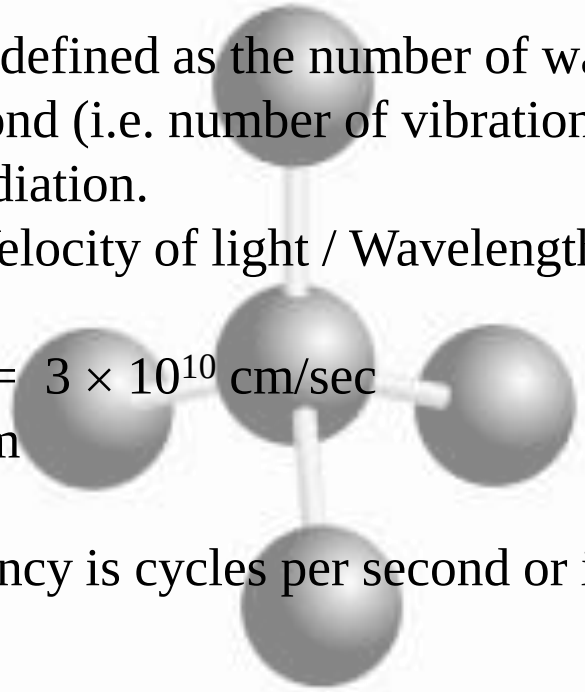
Frequency (ν) = Velocity of light / Wavelength

$\nu = c/\lambda$

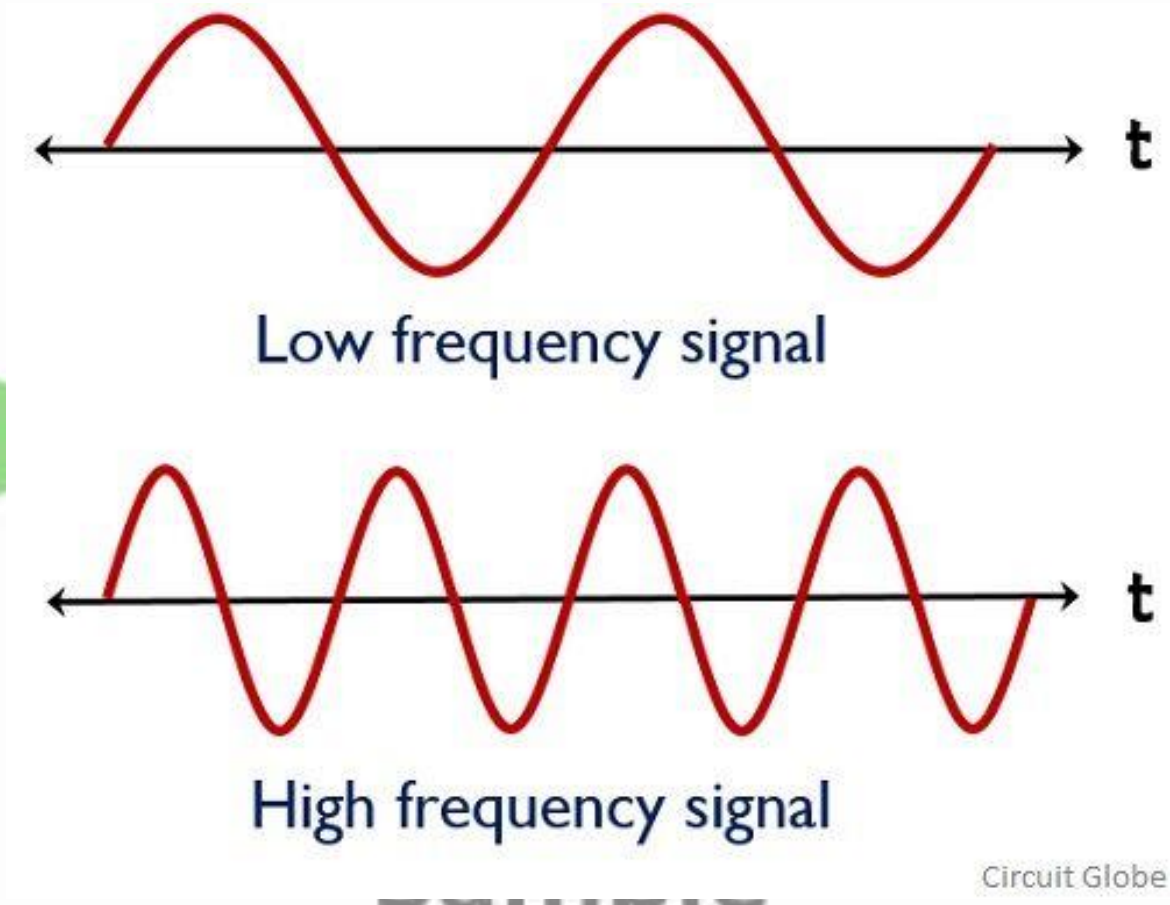
Velocity of light c = 3×10^{10} cm/sec

Wavelength λ in cm

The unit for frequency is cycles per second or in (Hz).

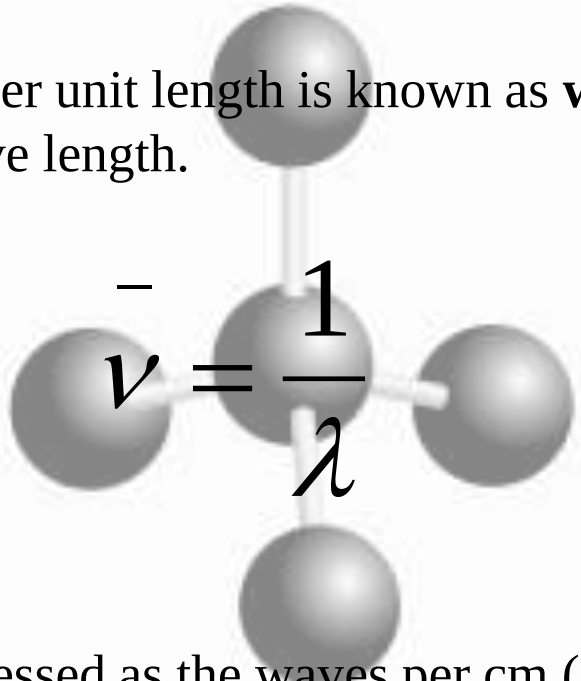


Frequency


t
Low frequency signal
t
High frequency signal
Circuit Globe

Wave number(V)

The number of waves per unit length is known as **wave number** and is expressed as the reciprocal of wave length.



$$\bar{\nu} = \frac{1}{\lambda}$$

Wave number is expressed as the waves per cm (cm^{-1}). This unit is also called Kayser (K).