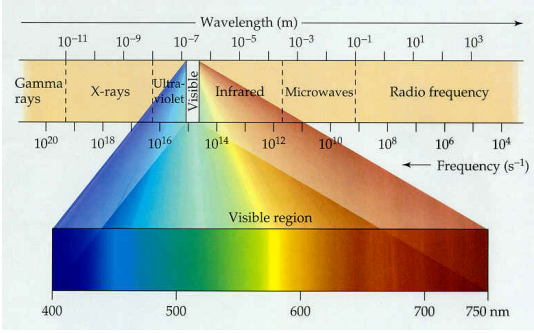
Scattering of light

Monochromatic vs Polychromatic

Visible light represents only a tiny part of the spectrum of electromagnetic waves.



It can be monochromatic when it is made of only one wavelength.

Ex: LASER light

It can be polychromatic when it is made of multiple radiations.

Ex: Sunlight can be decomposed into a rainbow, showing that it is made of all radiations of the visible light.

Refraction and scattering

1. REFRACTION INDEX AND WAVELENGTH.

The refraction index of an homogeneous transparent material depends on the wavelength of the radiation travelling through it. The lower the wavelength, the higher the refraction index.

2. SCATTERING AS A CONSEQUENCE.

The angle of refraction of a radiation depends on the refraction index of the materials crossed, and therefore depends on the wavelength of the radiation.

The higher the refraction index, the lower the angle of refraction. Therefore, the lower the wavelength, the less a radiation is refracted.

A polychromatic light will therefore be scattered.

3. SCATTERING OF LIGHT BY A PRISM.

At the entry surface of the prism, there is a first refraction of light. It then travels straight to the prism towards its exit surface, where it is refracted again.

Incident light undergoes a double refraction, explaining its important scattering.

Note: Other scattering devices exist, such as diffracting gratings. It is a device consisting of a thin sheet of glass or transparent plastic on which microscopic grooves (from a few hundred to several thousand lines per mm) have been etched at regular intervals. The resulting spectrum includes a central spot of the same color as the light source, and several spectra on either side, which become more and more spread out as you move away from the central spot. Each of these spectra shows the colors in the reverse order of a prism