1.2. BLACKBODY RADIATION

Introduction: It was discovered by Max Planck in 1900, leading to the development of quantum mechanics.

Blackbody: The idealized physical body that absorbs the entire radiation incident on it is called a black body or perfect blackbody.

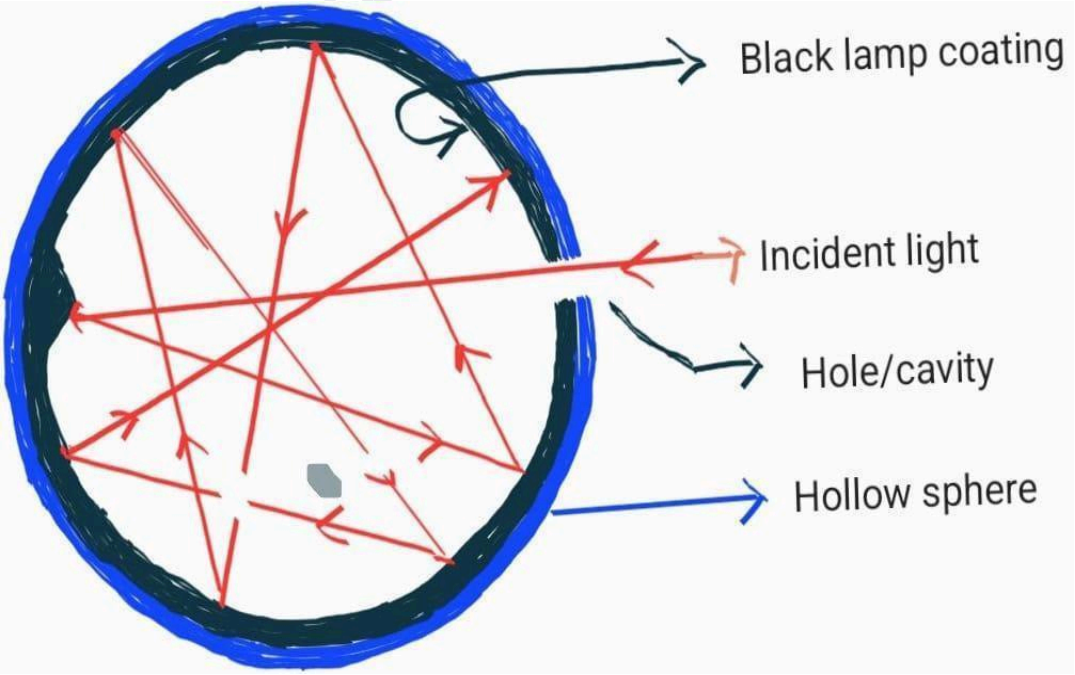
Radiation: The process of heat transfer from a body by virtue of its temperature without involving the medium is known as radiation.

Blackbody Radiation: The radiation emitted by a perfect black body is called black body radiation.

Examples:

1. Ferry's Blackbody
2. Wein's Blackbody

- A perfectly blackbody is a good absorber as well as a good radiator. Actually, there is no perfect blackbody, it's just an ideal concept.



- An ideal black body can be constructed by taking a hollow sphere and drilling a small hole in it. The inner surface is coated with lamp black, which is considered a near-perfect absorber.
- Light entering the cavity through the hole strikes the inner surface. A portion of the light is absorbed, and the rest is reflected.
- The reflected component then hits another point on the inner surface, where again it is partially absorbed and partially reflected.
- This process continues with multiple reflections within the cavity, effectively trapping the light inside. Consequently, the hole acts as a perfect absorber and appears completely dark.
- Conversely, when the cavity is heated, the radiation generated inside escapes through the hole, encompassing all wavelengths.
- Therefore, the hole functions as a perfect emitter, exhibiting the characteristics of blackbody radiation.
- Its spectrum can be analyzed using an IR spectrometer, allowing for the determination of the blackbody's emissive power at different wavelengths.