5.4 - Thermal Radiation

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- (2007) What is blackbody radiation of a given body?
- (2007) Explain why heat may just mean infrared.
- (2007) State Prvost's theory of heat exchange.
- (2007) What is Wien's displacement law?
- (2007) The sun's surface temperature is about 6000 K. The sun's radiation is maximum at wavelength of $0.5 \times 10^{-6}m$. A certain light bulb filament emits radiation with maximum wavelength of $2 \times 10^{-6}m$. If both the surface of the sun and of the filament have the same emissive characteristics, what is the temperature of the filament?
- (2010) State Stefans law of thermal radiation.
- (2010) A solid copper sphere cools at the rate of 2.8°C/min when its temperature is 127°C. At what rate will a solid copper sphere of twice the radius cool when its temperature is 227°C? In both cases the surroundings are kept at 27°C and conditions are such that Stefans law may be applied.
- (2010) Explain the observation that a piece of wire when steadily heated up appears reddish in color before turning bluish.
- (2013) A black body of temperature θ is placed in a blackened enclosure maintained at a temperature of 100°C. When its temperature rises to 30°C the net rate of loss of energy from the body was found to be 10 Watts. Find the power generated by the body at 50°C if the energy exchange takes place solely by the process of forced convection.
- (2013) Write down three laws governing the black body radiation.
- (2015) The element of an electric fire with an output of 1000 W is a cylinder of 250 mm long and 15 mm in diameter. If it behaves as a black body, estimate its temperature.
- (2016) Briefly explain why:
  - A body with large reflectivity is a poor emitter.
  - The earth without its atmosphere would be too cold to live.
- (2016) What is meant by thermal radiation?
- (2016) Why is the energy of thermal radiation less than that of visible light?

- (2016) A body with a surface area of 5.0 cm^2 and a temperature of 727°C radiates 300 joules of energy in one minute. Calculate its emissivity.
- (2017) State the following according to heat exchange:
  - Prevosts theory.
  - Wien's displacement law.
- (2018) Why during emission of radiations from black body its temperature does not reach zero Kelvin?
- (2018) A black ball of radius 1 m is maintained at a temperature of 30°C . How much heat is radiated by the ball in 4 seconds?
- (2019) Sketch the graph to illustrates how the energy radiated by a black body is distributed among various wavelengths.
  - What information would be drawn from the graph above? Give three points.
- (2019) At what temperature will the filament of a 10 W lamp operate if it is supposed to be a perfectly black body of area 1 cm^2 ?