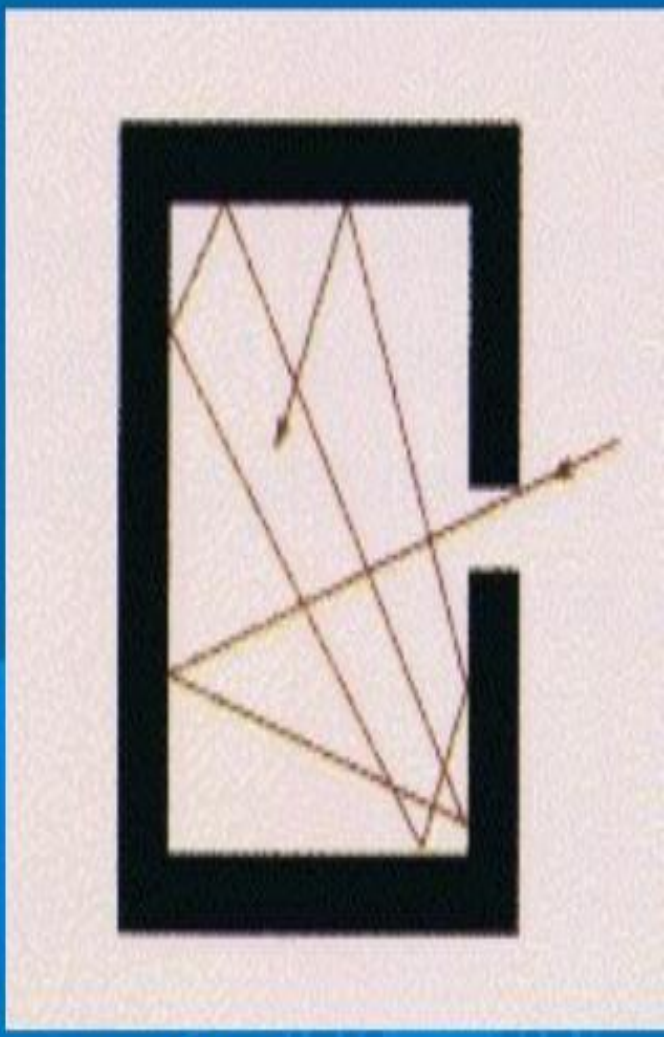
Definition of a black body

A black body is an ideal body which allows the whole of the incident radiation to pass into itself (without reflecting the energy) and absorbs within itself this whole incident radiation (without passing on the energy). This propety is valid for radiation corresponding to all wavelengths and to all angels of incidence. Therefore, the black body is an ideal absorber of incident radaition.



Univ. of Oregon web site

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Black-Body Radiation Laws (3)

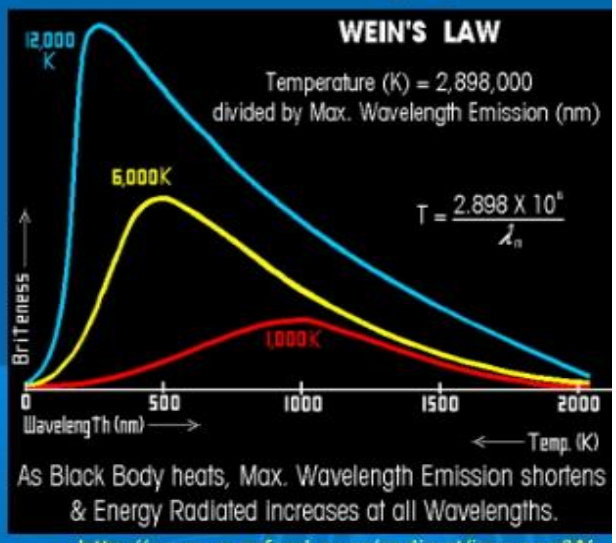
$\lambda_{max} = \frac{b}{T}$

3- Wein Displacement Law

- It tells us as we heat an object up, its color changes from red to orange to white hot.
- You can use this to calculate the temperature of stars.

The surface temperature of the Sun is 5778 K, this temperature corresponds to a peak emission = 502 nm = about 5000 Å.

- b is a constant of proportionality, called Wien's displacement constant and equals 2.897 768 5(51) × 10^{-3} m K = 2.897768 5(51) × 10^{6} nm K.



http://www.rumford.com/radiant/images/Wiengraph.gif

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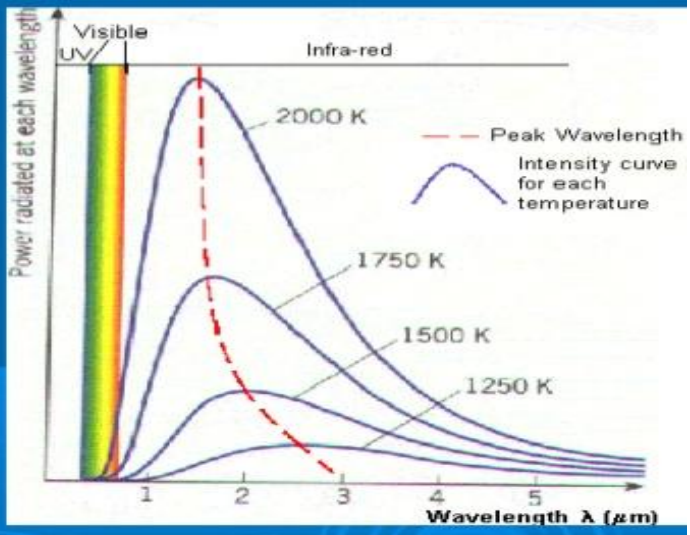
Conclusion

- As the temperature increases, the peak wavelength emitted by the black body decreases.
- As temperature increases, the total energy emitted increases, because the total area under the curve increases.
- The curve gets infinitely close to the x-axis but never touches it.



http://www.astro.ufl.edu/~oliver/ast3722/lectures/BasicDetectors/BlackBody.gif

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