Week 4-mollaiyan-mohammadjavad

Tuesday, October 29, 2019 3:44 PM

wood	foam
0,03	0,03
0,14	0,14
0,11	0,11
NO	3,428 → 3,528
0,63	NO
0,079	0,079
0,12	0,12
1,109	3,899
	4,007

$A_{total} = 100\ m^2$, $\Delta T = 24\ C$

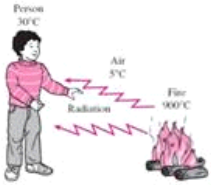
$$U_{tot} = U_{wood} \times \frac{A_{wood}}{A_{total}} + U_{ins} \times \frac{A_{ins}}{A_{tot}} = 0,25 \times U_{wood} + 0,75 \times U_{ins}$$

$$U_{tot} = 0,25 \times 0,9017 + 0,75 \times 0,2495 = 0,412$$

$$U_{wood} = \frac{1}{R'_{wood}} = \frac{1}{1,109} = 0,9017$$

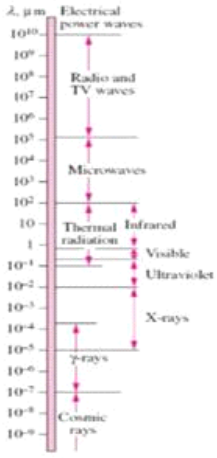
$$U_{ins} = \frac{1}{R'_{ins}} = \frac{1}{4,007} = 0,2495$$

$$Q_{tot} = U_{tot} \times A_{tot} \times \Delta T = 0,412 \times 100 \times 24 = 988,8$$



RADIATION: conduction and convection require matter to transfer heat. Radiation is a heat transfer that doesn't need matters between object to transfer heat . Radiation is a form of energy transport made of electromagnetic waves traveling at the speed of light.

Electromagnetic radiation is called that because wave electromagnetic radiant energy. It includes all kind of waves from visible to invisible .



The electromagnetic wave spectrum.

Electromagnetic waves have direct relation with speed of light and uposite relation with wave frequescy

$$\lambda = \frac{c}{\nu}$$

Blackbody is a surface that can take all radiation energy from any direction and it doesn't deepened on wavelength too .

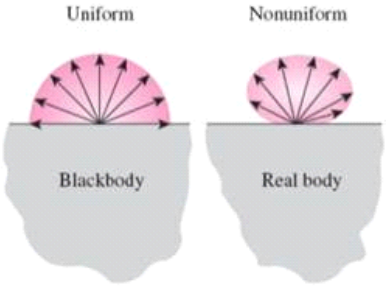
The radiation energy emitted by a blackbody:

$$E_b(T) = \sigma T^4 \qquad (\mathrm{W/m^2})$$

Blackbody emissive power

$$\sigma = 5.670 \times 10^{-8}\ \mathrm{W/m^2 \cdot K^4}$$

Stefan–Boltzmann constant

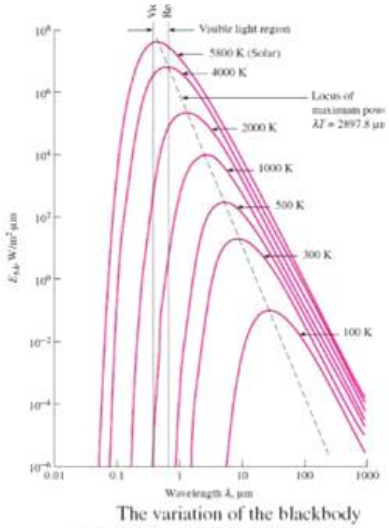


Wien's law formula:

Wien law perpose that radiation of blackbody in curve shows us that more temperature give us more peaks . At the same time the wave length have opposite relation with the temperature and less wavelength will show more temperature

Maximum wavelength = Wien's displacement constant / Temperature

Most of the visible wave are have low wavelength and at the same time high temperature .



The variation of the blackbody emissive power with wavelength for several temperatures.