

CH301H – Principles of Chemistry I: Honors
Fall 2013, Unique 52195

Quiz 2, 26 September 2013

The sun is, to a very good approximation, a 5000 K blackbody with an emission maximum of 550 nm. What is this energy in cm^{-1} and Hz?

The following information may be helpful.

$$q = 1.602 \times 10^{-19} \text{ C}$$
$$\epsilon_0 = 8.854 \times 10^{-12} \text{ C}^2 \text{ J}^{-1} \text{ m}^{-1}$$
$$h = 6.626 \times 10^{-34} \text{ J s}$$
$$c = 3.0 \times 10^8 \text{ m s}^{-1}$$

Extra Credit (not much): With the information above, draw the solar spectrum (i.e. the spectrum of light emitted from the sun) with clearly labeled axes. Make your x -axis represent wavelength and your y -axis represent intensity (which is unitless).

$$E = h\nu, \quad c = \lambda\nu$$

$$\nu = \frac{c}{\lambda} = \frac{3.0 \times 10^8 \text{ m/s}}{550 \times 10^{-9} \text{ m}} = \boxed{5.5 \times 10^{14} \text{ s}^{-1} = \nu}$$

$$550 \text{ nm} \left(\frac{1 \text{ m}}{10^9 \text{ nm}} \right) \left(\frac{100 \text{ cm}}{1 \text{ m}} \right) = \left(5.50 \times 10^{-5} \text{ cm} \right)^{-1} = \boxed{1.82 \times 10^4 \text{ cm}^{-1}}$$

(this unit is called a wavenumber and is actually very useful)

EC:

