

For all problems except multiple choice/fill-in-the-blank, please show all of your work. The steps you show to solve each problem are as important as the final answer. Notecards and calculators are allowed.

1. Last week Panasonic unveiled the highest efficiency rooftop solar panel ever produced commercially. The element used in these solar panels is silicon, which can utilize photons with energies equal to or greater than 1.11 eV, or 1.79×10^{-19} J. What is the longest wavelength (in nm) light that can produce electricity with these solar panels? Write your answer to the correct number of significant figures. Note: $h = 6.626 \times 10^{-34}$ J·s and $c = 2.998 \times 10^8$ m/s

2. Write the full electron configuration using orbital box notation for the element Si.

3. Rank the following elements, from lowest to highest, in terms of first ionization energy: Ga, Cl, Ne, P, K.

4. Use the Rydberg equation, $\frac{1}{\lambda} = R \left(\frac{1}{n_{final}^2} - \frac{1}{n_{initial}^2} \right)$, to determine the wavelength of the second-lowest energy transition in the Balmer Series. Note: $R = 1.097 \times 10^7 \text{ m}^{-1}$