CHEM 105 – Dr. Lammi Name: _____

Quiz 2 – Sept. 4, 2019

$c = 2.9979 \times 10^8$ m/s $h = 6.626 \times 10^{-34}$ J · s $E_{photon} = h\nu$ $\nu = \frac{c}{\lambda}$

$\Delta E = -2.178 \times 10^{-18} J \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$ $E_{photon} = |\Delta E|$ $E_{K,\ ejected\ e^-} = E_{photon} - \phi$ $E_K = \frac{1}{2}mv^2$ $\lambda_{matter} = \frac{h}{mv}$

1. (7 pts) Planck showed that energy is ***quantized*** (forming the basis for our modern understanding of electrons). Explain **in a few words** what this term means and **give the equation** that is associated with Planck's work.

2. (18 pts) Suppose that you want to build a new device that functions on the basis of the photoelectric effect. You have a green laser pointer with a wavelength of 543.0 nm and are looking for a suitable metal from which your laser photons will eject electrons.

   a. (8 pts) What is the **energy of each photon** emitted by the laser?

   b. (3 pts) Several metals and their work functions are listed below. Please fill in the element names corresponding to the symbols provided.

Element symbol	**Element Name??**	Work Function (J)
Cs		3.124×10^{-19}
Rb		3.621×10^{-19}
Sm		4.325×10^{-19}

   c. (7 pts) **Which of the metals above could you use in your device?** (That is, from which one(s) can your laser eject electrons?) Be sure to **show your work and/or explain** your reasoning.