SHOW WORK TO RECEIVE CREDIT

$E = h\upsilon$ $c = \lambda\upsilon$ $E_n = (-R_H)(1/n^2)$ $E = h\upsilon$

$R_H = 2.18 \times 10^{-18}$ $c = 3.0 \times 10^8$ m/s $h = 6.63 \times 10^{-34}$ J·s

Key 8a

1. (9 Pts) Write out the **complete** electron configuration for each of the following:

a. Phosphorous $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

b. Cobalt $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^7$

c. Ca^{2+} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

2. (2 Pts) Write out the **shorthand** electronic configuration for arsenic:

$[Ar]\ 4s^2\ 3d^{10}\ 4p^3$

3. (3 Pts) Calculate the frequency of visible light having a wavelength of 456 nm.

$c = \nu\lambda$

$\nu = \frac{c}{\lambda} = \frac{3.0 \times 10^8 \text{ m/s}}{456 \times 10^{-9} \text{ m}} = 6.54 \times 10^{14}\ s^{-1}$

4. (3 Pts) How many unpaired electrons does an atom of sulfur have?

$[Ne]\ 3s^2\ 3p^4$ ↑↓ ↑ ↑ (2)

5. (4 Pts) a. Give the symbols for two diamagnetic elements _____ and _____.

b. Give the symbols for two paramagnetic elements _____ and _____.

6. (4 Pts) Calculate the energy, in joules, required to excite a hydrogen atom by causing an electronic transition from the n = 2 to the n = 3 principal energy level.

$\Delta E = E_{final} - E_{initial}$

for n = 3 $E_3 = (-R_H)\left(\frac{1}{n^2}\right) = -2.18 \times 10^{-18}\left(\frac{1}{3^2}\right) = -2.42 \times 10^{-19}$ J

for n = 2 $E_2 = (-2.18 \times 10^{-18})\left(\frac{1}{2^2}\right) = -5.45 \times 10^{-19}$ J

$(-2.42 \times 10^{-19}) - (-5.45 \times 10^{-19}) = 3.03 \times 10^{-19}$ J