

SHOW WORK TO RECEIVE CREDIT

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

$$R_H = 2.18 \times 10^{-18}$$

$$E_n = (-R_H)(1/n^2)$$

$$c = 3.0 \times 10^8 \text{ m/s}$$

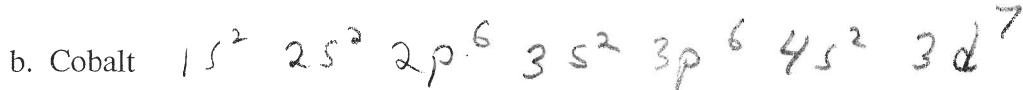
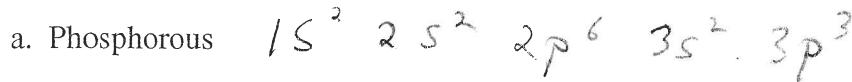
$$E = h\nu$$

$$h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$$

Key

8a

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



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



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

$$c = \nu\lambda$$

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

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



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.

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

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

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

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