Answer on Question #55760 - Chemistry - General chemistry

Question:

1. The ni = 2 to nf = 6 transition in the Bohr hydrogen atom corresponds to the a)_____ of aphoton with a wavelength of b)_____ nm.a) Is this transition of energy state absorption of photon or emission of photon?b) Calculate the corresponding wavelength(λ) of photon; nm = 10-9 m(use Rydberg equation)2. The lowest orbital energy is reached when the number of electrons with the same spin ismaximized. This statement describes _____.

Solution

1. This transition of energy state is absorption of photon because the transition proceeds for the lower to the upper energy level, so some amount of energy required to do that. The wavelength responsible for this transition can be calculated using Rydberg's equation:

$$\frac{1}{\lambda} = R_H \left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right)$$

$$\frac{1}{\lambda} = 1.097 \times 10^7 \left(\frac{1}{2^2} - \frac{1}{6^2}\right) = 2.346 \times 10^6$$

$$\lambda = \left(\frac{1}{2.346 \times 10^6}\right) = 4.102 \times 10^{-7}\ m \text{ or } 410 \text{ nm}$$

The n_i = 2 to n_f = 6 transition in the Bohr hydrogen atom corresponds to the **a) absorption of aphoton** with a wavelength of **b) 410 nm**.

2. The lowest orbital energy is reached when the number of electrons with the same spin ismaximized. This statement describes**Hund's rule**.