

CHM 1045 Exam 4 Answers to Sample Problems

You should know the following equations and values:

$$c = \lambda \nu$$

$$E_{\text{electron}} = -2.180 \times 10^{-18} \text{J} (1/n^2)$$

$$1/\lambda = 109,700 \text{cm}^{-1} (1/n_{\text{lower}}^2 - 1/n_{\text{upper}}^2)$$

$$E_{\text{photon}} = h\nu$$

$$c = 2.99 \times 10^{10} \text{cm/sec}$$

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

$$\text{Rydberg's } R = 109,700 \text{cm}^{-1}$$

Examples of the kinds of problems you should be able to solve:

What is the wavelength of the photon of light produced when an electron on a hydrogen atom falls from the 4th energy level to the 2nd energy level? (Planck's constant = $6.63 \times 10^{-34} \text{J} \cdot \text{Sec}$)

$$1/\lambda = 109,700 \text{cm}^{-1} (1/2^2 - 1/4^2) \quad \lambda = 4.86 \times 10^{-5} \text{cm}$$

What is the energy of an electron in the 6th energy level of a hydrogen atom?

$$E_{6\text{th}} = -2.180 \times 10^{-18} \text{J} (1/6^2) = -6.06 \times 10^{-20} \text{J}$$

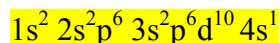
What is the wavelength of radio waves whose frequency is 99.5 MHz?

$$c = \lambda f \quad \lambda = c/f = 2.99 \times 10^{10} \text{cm/sec} / 99.5 \times 10^6 \text{sec}^{-1} = 300 \text{cm}$$

What is the energy of the photon of light produced when an electron on a hydrogen atom falls from the 4th energy level to the 2nd energy level? (Planck's constant = $6.63 \times 10^{-34} \text{J} \cdot \text{Sec}$)

$$E_{\text{photon}} = hc/\lambda \quad \lambda = 4.86 \times 10^{-5} \text{cm (from \#1)}$$
$$E = (6.63 \times 10^{-34} \text{Jsec} \times 2.99 \times 10^{10} \text{cm/sec}) / 4.86 \times 10^{-5} \text{cm} = 4.08 \times 10^{-18} \text{J}$$

Write the complete electron configuration of copper.



Describe the shapes of s, p, and d orbitals.

