**Quiz 7**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. The most prominent line the emission spectrum of magnesium is at 285.2 nm. Other lines are found at 383.8 and 518.4 nm. (c = 2.99792458 × 108 m/s, h = 6.6260696 × 10-34 J s, NA = 6.02214129 ×1023/mol) (10 points).
	1. What is the frequency of the most prominent line?

$$ν=\frac{c}{λ}=\frac{2.99792458×10^{8} \frac{m}{s}}{285.2×10^{-9} m}=1.051165701 ×10^{15}\frac{1}{s}≈1.051×10^{15}\frac{1}{s}$$

* 1. What is the energy of one photon with this wavelength?

$$E=\frac{nhc}{λ}$$

$$E=\frac{(1)\left(6.6260696×10^{-34} J s\right)\left(2.99792458×10^{8} \frac{m}{s}\right)}{285.2×10^{-9} m}=6.965×10^{-19}\frac{J}{photon}$$

* 1. Of one mol of these photons?

$$6.965×10^{-19}\frac{J}{photon}×\frac{6.02214129×10^{23} photons}{1 mol photons}×\frac{1 kJ}{1000 J}=419.4\frac{kJ}{mol}$$

1. Answer the following questions about quantum numbers (10 points):
	1. When n = 4, what are the possible values of ℓ? \_\_\_\_n = 0, 1, 2, 3
	2. When ℓ is 2, what are the possible values of mℓ? \_\_\_\_ mℓ = -2, -1, 0, 1, 2
	3. For a 5s orbital, what are the possible values of n, ℓ, and mℓ?

n = 5, ℓ = 0, and mℓ = 0

* 1. For a 4f orbital, what are the possible values of n, ℓ, and mℓ?
1. n = 4, ℓ = 3, and mℓ = -3, -2, -1, 0, 1, 2, 3