Unit 1 – Chapter 7: Atomic Structure & Periodicity	Name
Review Assignment	Period
Multiple Choice	
1. How many electrons in the ground state of a $\ell \ell = 2$?	copper atom have quantum numbers <i>n</i> = 3 and
a. 2 b. 6 e. 18	c. 8 d. 10
 2. What is the wavelength of light that has a free a. 200 nm b. 500 nm e. 5.0 X 10⁻⁷ nm 	quency of 6.0 X 10 ¹⁴ Hz? c. 200 nm d. 2.0 X 10 ⁶ nm
 3. What is the maximum number of electrons th a. 2 b. 5 e. 18 	at can occupy the 5f sublevel? c. 10 d. 14
 4. What is the maximum number of orbitals in a a. 2 b. 5 e. 18 	4d sublevel? c. 10 d. 14
 5. X: 1s²2s²2p³ Y: 1s²2s¹ Atoms X and Y have the ground state electron the compound most likely formed from X and a. YX b. Y₂X e. Y₅X 	ic configuration shown above. The formula for Y is c. Y ₃ X d. YX ₃
 6. A blue line in the atomic emission spectrum of the energy of this light per mole of photons? a. (10⁶)(6.63)(3.00)(6.02)/434 kJ/mol b. (10³)(6.63)(3.00)(6.02)/434 kJ/mol e. (10³)(434)(6.02)/(6.63)(3.00) kJ/mol 	f hydrogen has a wavelength of 434 nm. What is c. (10 ⁶)(6.63)(3.00)(6.02)/434 J/mol d. (10 ³)(6.63)(3.00)(6.02)/434 J/mol
 7. The wavelength of electromagnetic radiation a. its energy is small and its frequency b. its energy is small and its frequency c. its energy is large and its frequency i d. its energy is large and its frequency e. its energy is large and its amplitude 	is large. is small. s large. is small.

- ___ 8. The outermost electron in a ground state potassium atom can be described by which of the following sets of four quantum numbers?
 - a. (4, 0, 0, +1/2)c. (4, 1, 1, +1/2)b. (4, 1, 0, +1/2)d. (5, 0, 0, +1/2)e. (5, 1, 0, +1/2)

9. Gaseous atoms of which of the following elements are paramagnetic in their ground states?

I. Na	III. Al
II. Mg	IV. P
a. I, II, III, IV.	c. I, III, IV only.
b. I, II, III only.	d. II only.
e. III, IV only.	

_____ 10. Which set of quantum numbers is not allowed?

a. (2, 2, 1, +1/2)	c. (4, 3, -3, +1/2)
b. (3, 2, 0, -1/2)	d. (5, 4, 4, +1/2)
e. (6, 2, -1, +1/2)	

Free Response Questions

1. A line having a wavelength of 656 nm exists in the atomic emission spectrum of hydrogen.

- a. For the line, calculate the following values and specify their units:
 - i. frequency
 - ii. energy of a photon
 - iii. energy of a mole of photons
- b. What color is the line? Explain your reasoning.
- c. Discuss the origin of the line in terms of the Bohr theory of the atom. Specify any energy transitions that are applicable.

2. Molecules of oxygen are converted to atomic oxygen in the upper atmosphere by absorbing photons having wavelengths of 240 nm and shorter.

- a. Write the electron configuration of oxygen and tell why atomic oxygen is diamagnetic or paramagnetic.
- b. Write the electron configuration of the oxide ion. Assign a set of four quantum numbers to each of the electrons in the oxide ion. Correlate the sets to the electron configuration.
- c. Calculate the energy equivalent of a photon of wavelength 240 nm in units of kJ/mol.