PAL Worksheet – Chem 6A

Ions and ion formation

I. Electronic structure and valence electrons.

Draw shell models of N, O, F, Ne, Na, Mg. Then write the electron configurations of each.

nitrogen	oxygen	fluorine

Electron configurations

N:____________________ O: ____________________ F: ____________________

neon	sodium	magnesium

Electron configurations

Ne:____________________ Na: ____________________ Mg: ____________________

II. Formation of ions

A. <u>The octet rule</u>.

Formation of ions can be explained by the octet rule. What is this rule and how does it explain the formation of ions?

B. <u>Predicting ion formation</u>

Predict the ions each of the following elements will form. Indicate <u>what has to happen</u> in the atom for the ion to form. Then indicate # of protons (p+), # of electrons (e-), and how ion charge arises.

Element	**Atomic #**	**Ion**	**Change** (e.g lost 1 e-)	**# p+**	**#e-**	**ion charge**
neon	10	None	No change	10	10	(10+) + 10-) = 0
nitrogen	7	N^{3-}	Gained 3 e-	7	10	(7+) + (10-) = -3
oxygen						
fluorine						
sodium						
magnesium						
lithium						
cesium						
iodide						
xenon						
phosphorous						
calcium						
sulfur						
chlorine						
rubidium						
bromine						
selenium						
krypton						

C. Draw shell models of the **<u>ions</u>** formed by N, O, F, Na, and Mg and that of Ne (neutral form). Then write the electron configurations of each.

nitrogen, N^{3-} | oxygen, O^{2-} | fluorine, F-

Electron configurations

N^{3-}:____________________ O^{2-}: ____________________ F^{-}: ____________________

neon | sodium, Na^{+} | magnesium, Mg^{2+}

Electron configurations

Ne^{0}:____________________ Na^{1+}: ____________________ Mg^{2+}: ____________________

D. Which shell models in C above are the same? *Why* are they the same?

E. Identify the species by drawing the element symbol, including its charge if applicable, or by supplying the missing protons or electrons.

Protons	Electrons	Species	Notes
12	10		
		C	
	18		(list five correct answers)
		Ar	
33			(anion)
		Cu^{2+}	
19			(cation)
		Cl^{-}	
20			

III. Polyatomic ions

List the polyatomic ions your instructor has asked you to memorize.

Cations Anions