Laboratory Investigation: Ionic Bonding Puzzle

Name _____ Period _____ **/15**

Introduction

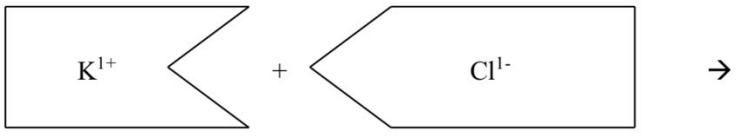
When metals and non-metals chemically react, the atoms will tend to form ions or charged atoms. Ions form because electrons are either gained or lost. Metals will generally form cations or positive ions, since they tend to donate electrons Non-metals will form anions or negative ions, since they tend to accept electrons.

Pre-Lab Questions

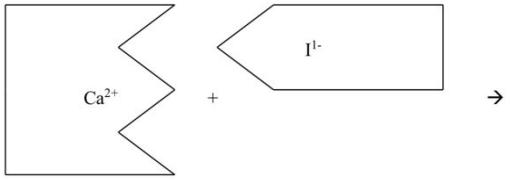
1. Metals _____ electrons and become positive ions or _____.
2. Non-metals _____ electrons and become negative ions or _____.
3. Cations and anions are _____ to each other because of their opposite _____.
4. In a chemical formula, such as Al_2O_3 the subscripts show the _____ of each atom in the _____.
5. For an ionic compound, the charges of the cation and the anion need to _____ to make a _____ compound. The chemical _____ shows the _____ of each ion as a subscript to make a neutral compound.
6. When writing the formula for a compound the _____ comes first and the _____ comes second.
7. The cation name is the same as the _____. If the anion is monoatomic it gets an _____ ending. If any of the ions are polyatomic, the name is what it is on the polyatomic ion list.
8. Remember, when naming cations for transitions metals, a _____ _____ needs to come in parenthesis after its name to show its _____.

Word Bank				
cations	anions	gain	lose	charge
charges	Roman numeral	compound	neutral	formula
attracted	ratio	number	cation	balance
anion	metal	nonmetal	-ide	

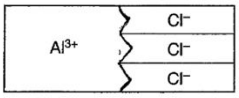
9. Using the ion cards: What ratio will the +1 and -1 ions combine to balance the charge? What will be the formula for this compound?



10. What ratio will the +2 and -1 ions combine to balance the charge? What will be the formula for this compound?



Activity In this activity you will create models of ionic compounds and observe the chemical formula of the binary compounds you have created. Make the following compounds with the puzzle pieces. Write their correct formulas and names. Your data will be recorded in a data table. The first one is done for you!

Combination	Cation Symbol	Anion Symbol	Chemical Formula	Compound Name	Drawing of your puzzle pieces
Aluminum and Chloride	Al^{+3}	Cl^{-1}	$AlCl_3$	aluminum chloride	
Calcium and Hydroxide					
Iron (III) and Chloride					
Yttrium (III) and Bromide					
Calcium and Phosphide					
Lithium and Phosphate					
Iron (III) and Oxide					
Sodium and Hydroxide					
Silver (I) and Hydroxide					
Lithium and Sulfate					
Copper (II) and Oxide					
Potassium and Sulfide					

Discussion/Conclusion

1. Draw the shape and write the charge of a cation model. Why do you think they are shaped this way?

2. Draw the shape and write the charge of a anion model. Why do you think they are shaped this way?

3. If you were to make a neutral atom following the model, what would the shape be?

4. In the compounds you formed, what is the final charge of all the compounds?