

POLYATOMIC

& MONATOMIC

IONS CHART

Positive Ions (cations)	
Aluminum	Al ³⁺
Ammonium	NH ₄ ⁺
Antimony (III)	Sb ³⁺
Antimony (V)	Sb ⁵⁺
Arsenic (III)	As ³⁺
Arsenic (V)	As ⁵⁺
Barium	Ba ²⁺
Beryllium	Be ²⁺
Bismuth (III)	Bi ³⁺
Bismuth (V)	Bi ⁵⁺
Cadmium	Cd ²⁺
Calcium	Ca ²⁺
Chromium (II)	Cr ²⁺
Chromium (III)	Cr ³⁺
Cobalt (II)	Co ²⁺
Cobalt (III)	Co ³⁺
Copper (I)	Cu ⁺
Copper (II)	Cu ²⁺
Hydrogen, hydronium **	H ⁺ , H ₃ O ⁺
Iron (II)	Fe ²⁺
Iron (III)	Fe ³⁺
Lead (II)	Pb ²⁺
Lead (IV)	Pb ⁴⁺
Lithium	Li ⁺
Magnesium	Mg ²⁺
Manganese (II)	Mn ²⁺
Manganese (IV)	Mn ⁴⁺
Mercury (I)*	Hg ₂ ²⁺
Mercury (II)	Hg ²⁺
Nickel	Ni ²⁺
Oxonium **	H ₃ O ⁺
Potassium	K ⁺
Scandium	Sc ²⁺
Silver	Ag ⁺
Sodium	Na ⁺
Strontium	Sr ²⁺
Tin (II)	Sn ²⁺
Tin (IV)	Sn ⁴⁺
Zinc	Zn ²⁺

Negative Ions (anions)

Acetate	CH ₃ COO ⁻
Borate	BO ₃ ³⁻
Bromate	BrO ₃ ⁻
Bromide	Br ⁻
Carbonate	CO ₃ ²⁻
Chlorate	ClO ₃ ⁻
Chloride	Cl ⁻
Chlorite	ClO ₂ ⁻
Chromate	CrO ₄ ²⁻
Cyanamide	CN ₂ ²⁻
Cyanide	CN ⁻
Dichromate	Cr ₂ O ₇ ²⁻
Dihydrogen phosphate	H ₂ PO ₄ ⁻
Ferricyanide	Fe(CN) ₆ ³⁻
Ferrocyanide	Fe(CN) ₆ ⁴⁻
Fluoride	F ⁻
Hydrogen carbonate	HCO ₃ ⁻
Hydrogen phosphate	HPO ₄ ²⁻
Hydrogen sulfate	HSO ₄ ⁻
Hydrogen sulfide	HS ⁻
Hydrogen sulfite	HSO ₃ ⁻
Hydride	H ⁻
Hydroxide	OH ⁻
Hypochlorite	ClO ⁻
Iodate	IO ₃ ⁻
Iodide	I ⁻
Nitrate	NO ₃ ⁻
Nitride	N ³⁻
Nitrite	NO ₂ ⁻
Oxalate	C ₂ O ₄ ²⁻
Oxide	O ²⁻
Perchlorate	ClO ₄ ⁻
Permanganate	MnO ₄ ⁻
Peroxide	O ₂ ²⁻
Phosphate	PO ₄ ³⁻
Phosphide	P ³⁻
Phosphite	PO ₃ ³⁻
Silicate	SiO ₄ ⁴⁻
Stannate	SnO ₃ ²⁻
Stannite	SnO ₂ ²⁻
Sulfate	SO ₄ ²⁻
Sulfide	S ²⁻
Sulfite	SO ₃ ²⁻
Tartrate	C ₄ H ₄ O ₆ ²⁻

First Last Name _____ Period _____

SCORE

_____/_____

7**IONIC****BONDS**

<u>7 IONIC BONDS</u>		<u> </u> / <u> </u> pts	First Last Name ___ Per ___
<u>Anticipatory Response</u>			<u>Cornell Question & Ans</u>
1. Ca ⁺ ions are positive? T F			Directions: Make 5 questions
2. Covalent bonds form from			& answers that are different
Cations & anions? T F			than the Anticipatory Response
3. Metals gain electrons while			1.
Nonmetals lose them? T F			
4. Ionic bonds are in crystals			
With repeating patterns? T F			
5. Ionic bonds are strong w/Hi			
Melting points cuz Ca ⁺ ions are			
near-by several anions? T F			
			2.
			3.
			4.
<u>Anticipatory Response</u>			
1. Metals give electrons to			
Non-metals? T F			
2. Non-metals are shiny? T F			
3. Metals form + ions? Y N			5.
4. The Octet Rule says atoms			
gain electrons to fill outer s&p			
sublevels w/ 8 electrons? T F			
5. Noble gases have s ² p ⁶			
configuration so they all react			
quite strong? T F			
Summary Section:			

Double Bubble Compare & Contrast

CONTRAST

COMPARE

CONTRAST

What is different about the two?

1 _____

What is the same about the two?

1 _____

What is different about the two?

1 _____

What is different about the two?

2 _____

What is the same about the two?

2 _____

What is different about the two?

2 _____

What is different about the two?

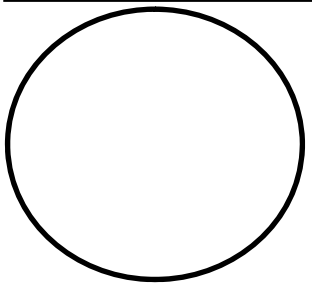
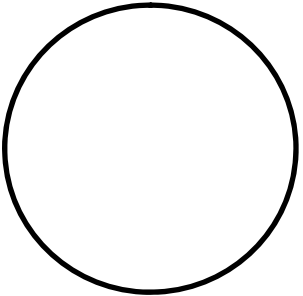
3 _____

What is the same about the two?

3 _____

What is different about the two?

3 _____



7.1

IONS

Section Review

Objectives

- Determine the number of valence electrons in an atom of a representative element
- Explain the octet rule
- Describe how cations form
- Explain how anions form

Vocabulary

- valence electrons
- electron dot structures
- octet rule
- halide ions

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

Elements within the same group of the periodic table behave similarly because they have the same number of 1. The 2 number of a representative element indicates how many valence electrons that element has. Diagrams that show valence electrons as dots are called 3. Gilbert Lewis's 4 states that in forming compounds, atoms tend to achieve the electron configuration of a noble gas.

The transfer of valence electrons produces positively charged ions, or 5, and negatively charged ions called 6. The cations of Group 1A elements always have a charge of 7. 8 are produced when atoms of the elements in Group 7A 9 an electron. For transition metals, the 10 of cations may vary.

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- _____ 11. The chlorine atom gains seven electrons when it becomes an ion.
- _____ 12. The chemical properties of an element are largely determined by the number of valence electrons the element has.
- _____ 13. Atoms acquire the stable electron structure of a noble gas by losing electrons.
- _____ 14. An atom of an element in Group 1A has seven valence electrons.
- _____ 15. Among the Group 1A and 2A elements, the group number of each element is equal to the number of valence electrons in an atom of that element.
- _____ 16. Sulfur and magnesium both have two valence electrons.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A

- _____ 17. electron dot structure
- _____ 18. valence electron
- _____ 19. octet rule
- _____ 20. cations
- _____ 21. anions
- _____ 22. halide ions
- _____ 23. chloride ion

Column B

- a. ions that are produced when halogens gain electrons
- b. a depiction of valence electrons around the symbol of an element
- c. has the electron configuration of argon
- d. an electron in the highest occupied energy level of an element's atom
- e. Atoms in compounds tend to have the electron configuration of a noble gas.
- f. atoms or groups of atoms with a negative charge
- g. atoms or groups of atoms with a positive charge

Part D Questions and Problems

Answer the following in the space provided.

24. Write the electron dot structures for the following atoms.
- a. silicon _____
- b. rubidium _____
- c. barium _____

7.2

IONIC BONDS AND IONIC COMPOUNDS

Section Review

Objectives

- Explain the electrical charge of an ionic compound
- Describe three properties of ionic compounds

Vocabulary

- ionic compounds
- ionic bonds
- chemical formula
- formula unit
- coordination number

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

- Anions and cations attract one another by means of 1. 1. _____
- The forces of attraction that hold 2 charged ions together in 2. _____
ionic compounds are called 3. Although they are composed 3. _____
of ions, ionic compounds are electrically 4. The lowest whole- 4. _____
number ratio of ions in an ionic compound is called a 5. 5. _____
- Nearly all ionic compounds are solid 6 at room 6. _____
temperature. Ionic compounds in general have very 7 7. _____
melting temperatures. This is because the 8 attractive 8. _____
forces between the ions result in a very 9 structure. 9. _____
- Ionic compounds conduct an electric current when in the 10. _____
10 state or dissolved in water.

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- _____ 11. During the formation of the compound NaCl, one electron is transferred from a sodium atom to a chlorine atom.

Name _____ Date _____ Class _____

- _____ 12. The coordination number of an ion is the number of ions of positive charge that surround the ion in a crystal.
- _____ 13. The coordination number of the ion Na^+ in NaCl is 6.
- _____ 14. In forming an ionic compound, an atom of an element gains electrons.
- _____ 15. Ionic compounds cannot conduct electricity if they are dissolved in water.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A

Column B

- | | |
|-------------------------------|--|
| _____ 16. ionic compounds | a. the number of ions of opposite charge surrounding each ion in a crystal |
| _____ 17. ionic bonds | b. compounds composed of cations and anions |
| _____ 18. chemical formula | c. shows the kinds and numbers of atoms in the smallest representative unit of a substance |
| _____ 19. formula unit | d. lowest whole-number ratio of ions in an ionic compound |
| _____ 20. coordination number | e. the electrostatic forces of attraction binding oppositely charged ions together |

Part D Questions and Problems

Answer the following in the space provided.

21. List the characteristics of an ionic bond.

22. Explain the electrical conductivity of melted and of aqueous solutions of ionic compounds using the characteristics of ionic compounds.

Name _____ Date _____ Class _____

- _____ 13. Metals that are good conductors of electricity are said to be ductile.
- _____ 14. Drifting valence electrons insulate cations from one another and contribute to the malleability of a metal.
- _____ 15. Metals are good conductors of electricity because electrons can flow freely in them.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A

Column B

- | | |
|---|--|
| _____ 16. ductile | a. an alloy whose component atoms are different sizes |
| _____ 17. metallic bonds | b. a mixture of two or more elements, at least one of which is a metal |
| _____ 18. alloy | c. can be hammered or forced into shapes |
| _____ 19. malleable | d. can be drawn into wires |
| _____ 20. interstitial alloy | e. the attraction of valence electrons for positive metal ions |

Part D Questions and Problems

Answer the following in the space provided.

21. Explain the physical properties of metals, using the theory of metallic bonding.

22. Explain why the properties of alloys are generally superior to their constituent components.

IONIC COMPOUNDS

COMPLETE THE FOLLOWING TABLE:

Cation Name	Cation Symbol	Anion Name	Anion Symbol	Ionic Compound Formed	Compound Formula
Sodium	Na ⁺	oxide	O ²⁻	Sodium oxide	Na ₂ O
Calcium		oxide			
Barium		carbonate			
Aluminum		nitrate			
	Li ⁺		S ²⁻		
Ammonium			OH ⁻		
				Tin (II) hydroxide	
	Fe ³⁺	nitride			
	Cu ⁺	carbonate			
Rb			ClO ⁻		
				Iron (III) nitrate	
				Potassium iodide	
			S ²⁻	Sodium sulfide	
			SO ₂ ²⁻	Sodium sulfite	
			SO ₃ ²⁻	Sodium sulfate	
Silver		nitrate			
Calcium			CO ₃ ²⁻		
	Ca ²⁺	hydroxide			
Iron (II)			S ²⁻		
Iron (III)			S ²⁻		
Calcium			N ³⁻	Nitr_____	
Calcium			NO ₂ ⁻	Nitr_____	
Calcium			NO ₃ ⁻	Nitr_____	Ca(NO ₃) ₂
					NaHSO ₄
					AlF ₃
Aluminum		Phosphide			
Aluminum		Phosphite			
Aluminum		Phosphate			

10

Ionic Dot Structure Practice

<p>1 Potassium & Fluorine</p> <p>.. K.--> .F: ..</p> <p>Charges: $K^{+1} F^{-1}$ Formula: KF Name: Potassium Fluoride</p>	<p>6 Strontium & Bromine</p> <p>Charges _____ Formula _____ Name _____</p>	<p>11 Calcium & Nitrogen</p> <p>Charges _____ Formula _____ Name _____</p>
<p>2 Calcium & Oxygen</p> <p>Charges _____ Formula _____ Name _____</p>	<p>7 Cesium & Oxygen</p> <p>Charges _____ Formula _____ Name _____</p>	<p>12 Aluminum & Sulfur</p> <p>Charges _____ Formula _____ Name _____</p>
<p>3 Aluminum & Phosphorus</p> <p>Charges _____ Formula _____ Name _____</p>	<p>8 Calcium & Iodine</p> <p>Charges _____ Formula _____ Name _____</p>	<p>13 Iron (III) & Oxygen</p> <p>Charges _____ Formula _____ Name _____</p>
<p>4 Barium & Oxygen</p> <p>Charges _____ Formula _____ Name _____</p>	<p>9 Lithium & Phosphorus</p> <p>Charges _____ Formula _____ Name _____</p>	<p><u>Covalent Structure Practice</u> Follow CNOF 4321 Valence- rules</p> <p>14 H_3P</p> <p>15 Cl_2O</p> <p>16 H_3COH</p> <p>17 NF_3</p>
<p>5 Barium & Chlorine</p> <p>Charges _____ Formula _____ Name _____</p>	<p>10 Magnesium & Silicon</p> <p>Charges _____ Formula _____ Name _____</p>	

6 -7 ELECTRONEGATIVITIES CHART REVIEW

Directions To know if a compound is Ionic, Polar Covalent or Nonpolar covalent subtract the 2 electronegativities of opposing atoms. Follow the examples:

BOND TYPE	IONIC	POLAR COVALENT	NONPOLAR COVALENT
<i>Electronegativity Difference</i>	Differ > 2.0	0.5 < Difference < 2.0	0.5 > Difference
<i>Explanation</i>	differ greater than 2.0	difference is between 0.5 & 2.0	The difference is less than 0.5

Questions

Compound	1st #	2nd #	Calculation	Difference	Catagorize	Bond Type
Ex: H ₂ O	H = 2.1	O = 3.5	/2.1-3.5/	= 1.4	0.5 < 1.4 < 2.0	Polar Covalent
SO ₂						
CO ₂						
NaCl						
NaF						
BaO						
CH ₄						
CCl ₄						
NH ₃						

H 2.1																
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.9	Ni 1.9	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5
Cs 0.7	Ba 0.9	La-Lu 1.0-1.2	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.9	Bi 1.9	Po 2.0	At 2.2
Fr 0.7	Ra 0.9	Ac 1.1	Th 1.3	Pa 1.4	U 1.4	Np-No 1.4-1.3										

4) As the elements in Group 1 are considered from TOP to BOTTOM, what happens to the

a) Electronegativity? _____

b) Ionization Energy? _____

c) Atomic Radius? _____

5) As the elements in Period 3 are considered from LEFT to RIGHT, what happens to the

a) Electronegativity? _____

b) Ionization Energy? _____

c) Atomic Radius? _____

6) What kind of relationship exists between electronegativity and ionization? _____

7) Explain why EN and IE have this relationship: _____

8) What electronegativity do all noble gases have? _____ Why?

Rubens' Science

Name _____

BONDING & NOMENCLATURE

Date _____ Period B

1. _____ tend to form ionic bonds.
- a. metals + non-metals b. non-metals + non-metals
 c. metals + metals d. all of the above
 e. none of the above
2. We know a chemical reaction has taken place when...
- a. light or flames are emitted b. the reaction produces bubbles
 c. a color change is observed d. all of the above
 e. none of the above
3. $MgCl_2$ is called
- a. magnesium dichloride since this compound is bonded covalently.
 b. magnesium chloride since this is an ionic compound
 c. monomagnesium dichloride since this is a covalent compound
 d. dichlorine magneside since this is an ionic compound
 e. not enough information
4. The American chemist that discovered the octet rule was...
- a. Albert Einstein b. Bock Chickenski
 c. Neils Bohr d. Gilbert Lewis
 e. all of these scientists shared in the discovery in 1916
5. The way substances look to us is due to their _____.
- a. diatomic molecules b. crystalline structure
 c. sub-atomic color frequencies d. all of the above
 e. none of the above

Name the following covalent compounds

6. P_2O_5 _____ 9. SO_3 _____
7. CCl_4 _____ 10. PBr_5 _____
8. B_3N_7 _____

Write the formulas for the following covalent compounds

11. sulfur dioxide _____ 14. silicon tetroxide _____
12. Tricarbon octabromide _____ 15. tetraselenium decoxide _____
13. dihydrogen monoxide _____

Match the following characteristics to the type of bond forming the compound

16. _____ high melting temperature a. Metallic bonding
17. _____ dissolves in water b. Covalent bonding
18. _____ within a "sea" of electrons c. Ionic bonding
19. _____ shared electrons
20. _____ forms O_2 , H_2 , and N_2 **12**

7

IONIC AND METALLIC BONDING

Chapter Quiz

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- _____ 1. ~~When a metal atom in a metal crystal has 12 neighbors, the arrangement is a face-centered cube.~~ 7.3
- _____ 2. The chlorine atom gains seven electrons when it becomes an ion. 7.1
- _____ 3. Ionic compounds conduct electricity better in the molten state than in the solid state. 7.2
- _____ 4. During the formation of the compound NaCl, one electron is transferred from a sodium atom to a chlorine atom. 7.2
- _____ 5. ~~A piece of metal consists of closely packed cations surrounded by mobile valence electrons.~~ 7.3

Fill in the word(s) that will make each statement true.

6. The electrons in the highest occupied energy level of an atom are called the 6 electrons. 6. _____ 7.1
7. The 7 rule states that atoms in compounds tend to have the electron configuration of a noble gas. 7. _____ 7.1
8. An oxygen atom attains a stable electron configuration by 8 two electrons. 8. _____ 7.1
9. Atoms and ions with 9 electrons in their highest energy levels are very stable. 9. _____ 7.1
10. ~~Silver forms a cation by attaining a 10 electron configuration with 18 outer electrons including d electrons.~~ 10. _____ 7.1
11. 11 tend to lose electrons when they react to form compounds. 11. _____ 7.1
12. An 12 is any atom or group of atoms with a negative charge. 12. _____ 7.1
13. The lowest whole-number ratio of ions in an ionic compound is known as a 13. 13. _____ 7.1

7

IONIC AND METALLIC BONDING

Practice Problems

In your notebook, answer the following.

SECTION 7.1 IONS

- For each element below, state (i) the number of valence electrons in the atom, (ii) the electron dot structure, and (iii) the chemical symbol(s) for the most stable ion.
 - Ba
 - I
 - K
- How many valence electrons does each of the following atoms have?
 - gallium
 - fluorine
 - selenium
- Write the electron configuration for each of the following atoms and ions.
 - Ca
 - chlorine atom
 - Na^+
 - phosphide ion
 - O^{2-}
- What is the relationship between the group number of the representative elements and the number of valence electrons?
- How many electrons will each element gain or lose in forming an ion? State whether the resulting ion is a cation or an anion.
 - strontium
 - aluminum
 - tellurium
 - rubidium
 - bromine
 - phosphorus
- Give the name and symbol of the ion formed when
 - a chlorine atom gains one electron.
 - a potassium atom loses one electron.
 - an oxygen atom gains two electrons.
 - a barium atom loses two electrons.
- How many electrons are lost or gained in forming each of the following ions?
 - Mg^{2+}
 - Br^-
 - Ag^+
 - Fe^{3+}
- Classify each of the following as a cation or an anion.
 - Na^+
 - Cu^{2+}
 - I^-
 - O^{2-}
 - Ca^{2+}
 - Cs^+

SECTION 7.2 IONIC BONDS AND IONIC COMPOUNDS

- Use electron dot structures to predict the formula of the ionic compounds formed when the following elements combine.
 - sodium and bromine
 - sodium and sulfur
 - calcium and iodine
 - aluminum and oxygen
 - barium and chlorine
- Which of these combinations of elements are most likely to react to form ionic compounds?
 - sodium and magnesium
 - barium and sulfur
 - potassium and iodine
 - oxygen and argon
- ~~What is the meaning of coordination number?~~
- ~~How is the coordination number determined?~~

SECTION 7.3 BONDING IN METALS

- What is a metallic bond?
- How is the electrical conductivity of a metal explained by metallic bonds?
- ~~Are metals crystalline? Explain.~~
- ~~Give three possible crystalline arrangements of metals. Describe each.~~
- What is an alloy?
- Name the principal elements present in each of the following alloys.
 - brass
 - bronze
 - stainless steel
 - sterling silver
 - cast iron
 - spring steel

7-8 BOND FORMATION

Directions: Write T or F and make the false statements true by a slight change.

1. Electronegativity is the attraction of an atom to electrons.
2. Active metals have low electronegativities because they are attracted to electrons.
3. The stronger a bond the higher the electronegativity difference between the bonded elements.
4. Covalent bonds are formed when elements with extremely different electronegativities are bonded.
5. Ionic bonds are formed by elements with a difference of at least 1.67 in their electronegativity.
6. Ionic bonds are weak while covalent bonds are strong.
7. Metallic bonds are "communal."

7-8 BONDING REVIEW DOT

Directions: Connect the dots to the most appropriate answers.

1.

Ionization Energy	Ability to transfer electrons	Metals
Malleability	Ability to be hammered into sheets	metalloids
Electronegativity	Noble gases have high requirement	nonmetals
Conductivity	Atoms attraction to electrons	noble gases
2.

Ionic bond	direct transfer of electrons	H ₂ O	2.87 difference
Polar Covalent	share electrons unequally	MgF ₂	1.30 difference
Covalent Bond	share electrons equally	O ₂ , H ₂	0.00 difference
Metallic Bond	octet rule already satisfied	Brass Alloy	-
No Bond	extra & shared delocalize electrons	NeCl ₂	-
3.

molecule	covalently bonded with an overall shared charge	Neutral
ionic compound	formed neutral with atoms of unlike electronegativities	+ or -
polyatomic ions	2 or more atoms form a non-charged covalent bond	Polar Covalent

First Name, Last

Period

SCORE: /10 pts

7 Ionic Bonding Formative Assessment 2

Directions:

Use your Periodic Table and help sheets. Circle the best answer.

- Ionic bonds are made from: Metals Non-metal Both
- The Octet Rule says that atoms can _____ electrons to have a complete outer energy level.
gain lose either gain or lose
- Metals tend to _____ electrons. gain lose
- Non-metals tend to _____ electrons. gain lose
- Alkali Metals tend to lose ____ electrons. 1 or 2 or 3
- Alkali Earth Metals tend to lose ____ electrons 1 or 2 or 3

Answer true or false

- ___ Carbon Dioxide is a covalent bond in which 2 nonmetals share electrons.
- ___ CCl_4 has an ionic bond where the metal transfers electrons to a nonmetal.
- ___ In NaCl, Sodium transfers one electron to Chlorine.
- ___ In NaCl, Sodium maintains a negative charge while Chlorine a "+" charge.

I	II	III	IV	V	VI	VII	0
H•							He••
Li•	•Be•	•B•	•C•	•N•	•O•	•F•	•Ne••
Na•	•Mg•	•Al•	•Si•	•P•	•S•	•Cl•	•Ar••
K•	•Ca•	•Ga•	•Ge•	•As•	•Se•	•Br•	•Kr••
Rb•	•Sr•	•In•	•Sn•	•Sb•	•Te•	•I•	•Xe••
Cs•	•Ba•	•Tl•	•Pb•	•Bi•	•Po•	•At•	•Rn••

Metal Metalloid Nonmetal

First Name, Last

Period

SCORE: /10 pts

Ionic Bonds Formal Assessment 1

Write **True** or **False** in the blank.

- ___ Ionic bonds are formed from a metal transferring electron(s) to a nonmetal.
- ___ Ionic bonds are formed from an anion transferring electron(s) to a cation.
- ___ Atoms gain or lose electrons until they have an octet (8 valence electrons).
- ___ When Calcium reacts with Fluorine, it transfers both valence electrons to one Fluorine atom.
- ___ Metals lose electrons and thus form negative ions called anions.
- ___ Nonmetals gain electrons and thus form negative ions called anions.

Multiple Choice

- Which bonds are very strong because they have a regular repeating pattern of cations, anions, cations, anions etc... which attracts all nearby ions.
 - ionic bonds
 - covalent bonds
 - metallic bonds
- Which bonds occur because both elements are fighting to take the other valence electrons resulting in the compromise of one another's valence electrons.
 - ionic bonds
 - covalent bonds
 - metallic bonds
- Which would not be ionic?
 - NaCl
 - CO₂
 - CaF₂
 - both a & c
- Which would not be covalent?
 - NaCl
 - CO₂
 - CaF₂
 - both a & c

4 -7 Cumulative Reteaching**4 Atomic Structure**

Problem Number	Symbol	Isotope Name	Avg Atomic Mass	Mass Number	Atomic Number =	Neutrons	Electrons	Protons
1.	⁸⁰ Br 35	Bromine-80	79.9	35		=		
2.					35	= 44		

Directions: Look at the above tables & highlight all appropriate answers (**all, some or none are correct**).

3. Isotopes of the same element have different number of: protons, electrons, neutrons,
 4. Elements are always Identified by the same: protons, neutrons, atomic mass
 5. Ions are formed because of a different number of protons, neutrons, electrons

25 Nuclear Chemistry

6.	Proton	7.		8.	Beta	9.		10.	Neutron
Mass	1 amu								
Letter	P		e			He			
Charge	+1								

Fill in all missing numbers	Reaction type	Radioisotope	Reactants	Reacts To Produce	Products	Fission Or Fusion
11.	Alpha decay	Thorium	²³² Th	→	₂ He +	

12. Which results in a decrease in the atomic number and atomic mass? (Alpha decay, beta decay, Alpha Capture)
 13. Which results in an increase atomic number but no change of atomic mass? (Alpha decay, beta decay, neither)

5&6 Electron Configuration

	Element	Electron Configuration	Noble Gas Shorthand	Highest Energy Level with Electrons	# electrons in highest level	Lewis Dot
14.	Iron					
15.		1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ¹				

16. In "6s¹", the 6 represents which 3 → (column, group, family, period, row or energy level).
 17. In "6s¹", the s¹ represents which one? (alkalis, alkali earth, halogens, noble gas).
 18. In "6s¹", the s¹ represents which 3 → (column, group, family, period, row or energy level).
 19. In "6s¹", the s¹ represents how many valence electrons that it can lose (1, 2, 3, 6).

7 Ions and Bonding

20. Which 2 have 2 valence electrons? (sodium, magnesium, Group 2A, Group 3A)
 21. Calcium's charge after reacting would be (1-, 0, 1+, 2+)
 22. Ca⁺ion means (a positive ion, a neutral ion, a negative ion) while the Cation is always written (first, last).
 23. Which Lewis Dot is correct for Calcium after it becomes an ion? (Ca, Ca., Ca:, none correct)
 24. Which formula is correct? (CaCl, CaCl₂, CaCl₃)
 25. Which is written correctly? (Na⁺Cl⁻, Cl⁻Na⁺, neither)

corrected by: _____