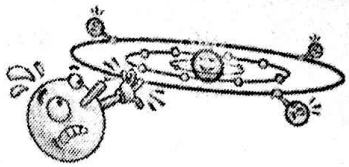
LESSON 18

CLASSWORK

Life on the Edge
Valence and Core Electrons

Name _____

Date _____ Period _____



Purpose

To discover the arrangements of electrons within atoms.

Instructions

Complete the table on the handout, filling in the missing atoms. Then answer the questions.

1. How does the number of electrons change as you move from left to right across a period?

   The number of electrons increases by one as you move from left to right, from one element to the next.

2. What do all the atoms of Group 1A elements have in common?

   They all have one electron in the outermost shell.

3. List three things that all the atoms of the elements in period 3 have in common.

   1. They all have three shells. 2. There are two electrons in the first shell. 3. There are eight electrons in the second shell.

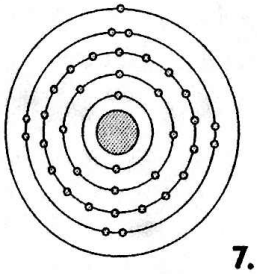
4. Which atoms have two electrons in the first shell and eight electrons in the second shell?

   neon, Ne, and all the elements in Periods 3 and 4

5. What happens to the electron count and the number of shells when you move from neon, Ne, to sodium, Na?

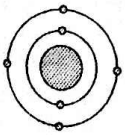
   A new shell is added. Also, one electron is added.

6. How many shells of electrons does rubidium, Rb, have? How many electrons are in the outermost shell? Draw a shell model of a rubidium atom.



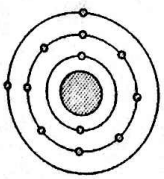
   Rubidium, Rb, is in Group 1A at the beginning of period 5. It has five shells, with one electron in the outermost shell. Rubidium is the element with the next higher atomic number after krypton, Kr, so it looks just like krypton with a fifth shell added and one electron in the fifth shell.

7. Draw a shell model of an atom with two shells and six electrons. What element is this? How many electrons are in the outermost shell?



   The element is carbon. It has four electrons in the outermost shell.

8. Draw a shell model of an atom with three shells and two electrons in the outermost shell. How many total electrons does this atom have? What element is this?



   There are a total of 12 electrons: The first shell has 2, the second shell has 8, and the third shell has 2. The element is magnesium.

9. Look at the periodic table and the handout The Shell Model. Explain why the number of electrons in the third shell suddenly changes from 8 to 18 between the element calcium, Ca, and the element gallium, Ga.

There are ten transition elements missing from the table that fit between calcium, Ca, and gallium, Ga.

10. Summarize at least three patterns you discovered during this lesson.

Sample Answers

All atoms in the same group have the same number of electrons in their outermost shell.

As you move across a period, the number of electrons increases by one, from element to element.

The number of shells is the same as the period number.

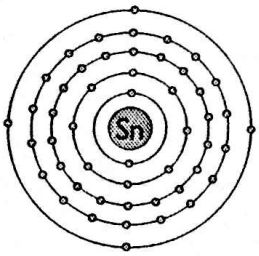
From helium, He, on, all atoms have two electrons in the first shell. From neon, Ne, on, all atoms have two electrons in the first shell and eight electrons in the second shell.

Atoms in the second and third period have the same number of electrons in the inner shells. Among these elements, only the number of electrons in the outermost shell changes.

11. **Making Sense** Explain how you can determine the arrangement of an element's electrons from the element's position in the periodic table.

The number of shells is the same as the period number. The number of electrons in the outermost shell is the same as the group number. The inner shells have 2 electrons in the first shell, 8 electrons in the second shell, 8 electrons in the third shell for elements before the transition elements, and 18 electrons in the third shell for elements after the transition elements.

12. **If You Finish Early** Predict the electron arrangement of tin, Sn. Draw a shell model of it. Explain your reasoning.



Tin, Sn, is in Group 4B with carbon, so it should have four electrons in its outer shell. Shells will likely have 2, 8, 18, 18, and 4 electrons from innermost to outermost.

- What does the p... number of electron shells)
- How can you determine the arrangement of an element's electrons from its position in the periodic table?

Key Points

The atomic number of an element is the same as the total number of electrons. As you proceed from one element to the next in the periodic table, the number of electrons increases by one. The number of electrons corresponds to the atomic number of each element.

The period (row) number of the element is the same as the number of electron shells. As you go down the periodic table, from one period to the next, the number of electron shells increases by one. In the first period, the atoms have electrons in only one shell. In the fourth period, the atoms have electrons in four shells.

For main-group elements, the group number of the element is the same as the number of electrons in the outermost shell. For example, all the Group 4A elements have four electrons in their outermost shell, while all the Group 8A elements have eight electrons in their outermost shell.

Discuss Patterns in Valence and Core Electrons

- Define valence and core electrons.
- Display the transparency Table of Valence and Core Electrons.
- With help from the students, determine the number of core and valence electrons from the handout and fill in the transparency Table of Valence and Core Electrons.

	1A							8A
1	H V = 1							He V = 2
		2A	3A	4A	5A	6A	7A	
2	Li V = 1 C = 2	Be V = 2 C = 2	B V = 3 C = 2	C V = 4 C = 2	N V = 5 C = 2	O V = 6 C = 2	F V = 7 C = 2	Ne V = 8 C = 2
3	Na V = 1 C = 10	Mg V = 2 C = 10	Al V = 3 C = 10	Si V = 4 C = 10	P V = 5 C = 10	S V = 6 C = 10	Cl V = 7 C = 10	Ar V = 8 C = 10
4	K V = 1 C = 18	Ca V = 2 C = 18	Ga V = 3 C = 28	Ge V = 4 C = 28	As V = 5 C = 28	Se V = 6 C = 28	Br V = 7 C = 28	Kr V = 8 C = 28

Part 2: Organize Your Ion Cards

Organize the cards according to the periodic table.

Analysis

1. List at least three patterns that you notice in the arranged cards.

   Sample Answers

   All ions in a group have the same charge.

   The elements on the left tend to form positive ions. The elements on the right tend to form negative ions.

   The magnitude of the charges increases toward the center.

2. What happens to the charge on an atom when electrons are removed?

   The atom has a positive charge. The number of protons hasn't changed, but electrons have been taken away. So protons outnumber electrons, resulting in a net positive charge.

3. What happens to the charge on an atom that gains electrons?

   The atom has a negative charge. The number of protons has not changed, but the number of electrons has increased, resulting in a net negative charge.

4. Does transferring an electron change the identity of the elements involved? Explain.

   Changing the number of electrons does not change the identity of the atom; only the charge changes. In order to change the identity of an atom, you need to change the number of protons in the nucleus.

5. **Making Sense** Why do you think this lesson is titled "Noble Gas Envy"?

   The arrangements of the electrons resemble those of the noble gas atoms. Noble gas atoms do not combine with other atoms. They are chemically stable as individual atoms. "Noble gas envy" implies that other atoms "want" to be stable like the noble gas atoms.

6. **If You Finish Early** Tin, Sn, can lose or gain four electrons.

   a. What is the charge on the tin atom if four electrons have been removed?

      +4

   b. Does tin resemble a noble gas after the four electrons have been removed? Explain.

      After four electrons are removed, an atom of tin has the same number of electrons in its outermost shell as an atom of the noble gas krypton, Kr. However, the third shell of tin has ten extra electrons compared to krypton.

Cation: An ion with a net positive charge. Usually these are formed from metal atoms.

Anion: An ion with a net negative charge. Usually these are formed from nonmetal atoms.

The ions formed from transition elements are exceptions to these simple rules. The charges on transition elements are not as predictable as those on main-group elements. We will address these elements later in the section.

Introduce "Noble Gas Envy"

T

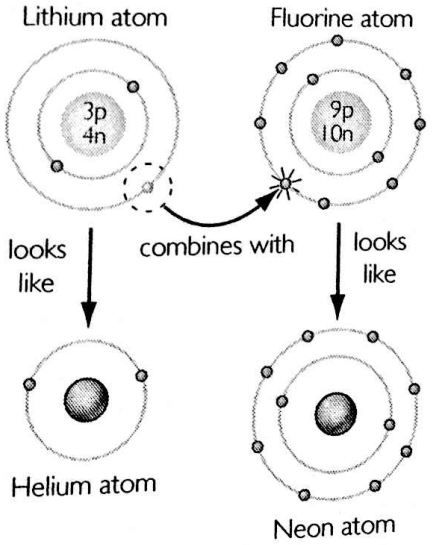
➡ Show the transparency Noble Gas Envy.

Sample Questions

- What connection can you find between the shell models of ions and the shell models of noble gases?
- Why do you think this lesson is titled Noble Gas Envy?

Key Points

After an electron transfer occurs, the electron arrangements of the resulting ions look surprisingly like the electron arrangements of noble gases. For example, when the compound lithium fluoride is formed, lithium gives up an electron to fluorine. Each atom now has the same electron arrangement as one of the noble gases: The lithium cation has the same electron arrangement as helium, He, and the fluorine anion has the same electron arrangement as neon, Ne.



Electron arrangements of atoms in ionic compounds resemble noble gases.

Atoms tend to lose or gain electrons to attain the electron arrangement of a noble gas. This tendency is what we're calling noble gas envy. It can be a powerful tool in helping predict the charges on ions. Atoms appear to "want" to have electron arrangements like those of the noble gases because of the chemical stability of the noble gases. It appears that atoms will combine with each other to form compounds only if the result is something fairly stable.

Wrap-up

chemical stability related to the arrangements of electrons

Answer Key

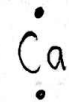
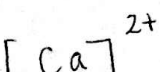
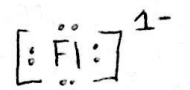
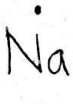
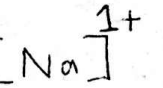
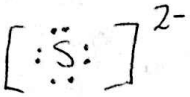
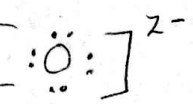
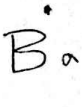
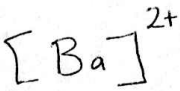
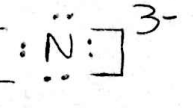
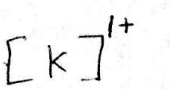
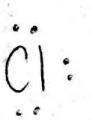
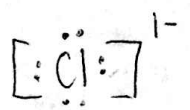
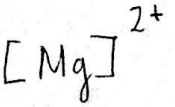
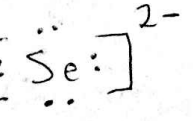
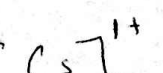
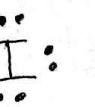
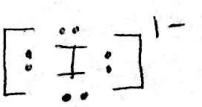
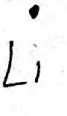
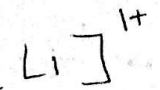
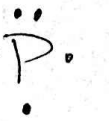
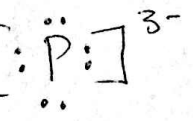
Chemistry Worksheet

Name: _____

Lewis Dot Structures

Block: _____

1. Draw the Lewis dot structures of the following **atoms** and their respective **ions**:

calcium	calcium ion		fluorine	fluoride
				
sodium	sodium ion		sulfur	sulfide
				
aluminum	aluminum ion		oxygen	oxide
				
barium	barium ion		nitrogen	nitride
				
potassium	potassium ion		chlorine	chloride
				
magnesium	magnesium ion		selenium	selenide
				
cesium	cesium ion		iodine	iodide
				
lithium	lithium ion		phosphorous	phosphide
				

Chemistry Worksheet
Lewis Dot Structures

Name: _____

Block: _____

2. Write the empirical formula and draw Lewis dot structures for these **ionic** compounds:

sodium chloride NaCl	magnesium sulfide MgS	beryllium phosphide Be_3P_2
calcium fluoride CaF_2	potassium oxide K_2O	strontium bromide $SrBr_2$
potassium iodide KI	lithium bromide LiBr	barium nitride Ba_3N_2

3. Write the chemical name and draw Lewis dot structures for these **ionic** compounds:

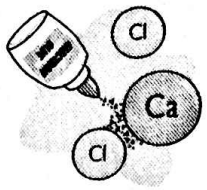
$BaCl_2$ Barium chloride	AlI_3 Aluminum iodine	Li_3P Lithium Phosphide
Na_3N Sodium Nitrate	K_2S Potassium Sulfide	Al_2O_3 Aluminum Oxide
Na_2O Sodium Oxide	RbBr Rubidium Bromide	Ca_3P_2 Calcium phosphide

LESSON 26 ACTIVITY

Electron Glue
Bonding

Name _____

Date _____ Period _____



Purpose

To investigate the different types of bonding found in substances and to relate bonding to the physical properties of substances.

Procedure

Read the handout Four Models of Bonding. Study the information on the Substance cards. Your job is to match each substance to its appropriate type of bonding on the handout.

Use the information on the cards to sort the 16 substances into the four categories of bonding. Write your results in the table.

Ionic	Network covalent	Metallic	Molecular covalent
$NaCl(s)$		$Na(s)$	$CH_4(g)$
$NaCl(aq)$	$C(s)$	$Hg(l)$	$CH_3CH_2OH(l)$
$CaCl_2(aq)$	$Si(s)$	$Cu(s)$	$H_2O(l)$
$NaOH(aq)$	$SiO_2(s)$*	$Pt(s)$	$C_{12}H_{22}O_{11}(s)$
$MgSO_4(s)$			

*Students might classify SiO_2 as molecular covalent.

1. Are there any substances that don't seem to fit properly in the categories you have placed them in? List them here and explain.

   Answers will vary. For example, magnesium sulfate has both ionic and covalent bonding (within the sulfate anion). Silicon is similar to carbon, but silicon conducts.

Use the handout to answer these questions.

2. What do the pictures of the four models of bonding attempt to show?

   Sample answer: The pictures attempt to show how the valence electrons are distributed among the atoms of each bonded substance.

3. Give the type of bonding for each substance described here.
   a. A substance made up entirely of metal atoms metallic bonding
   b. A substance made up of both metal and nonmetal atoms ionic bonding
   c. A substance made up entirely of nonmetal atoms

      either molecular covalent or network covalent bonding

4. Some substances made up entirely of nonmetal atoms are soluble in water, while others are not. Use the bonding models to explain why.

   In network covalent bonding, atoms are linked in all directions, so they can't break off and dissolve. In contrast, molecular covalent solids consist of bonded clusters of atoms.

5. How might the model for network covalent bonding explain the incredible hardness of a diamond?

   There is a strong network of bonds in all directions among all the carbon atoms.

6. Both sugar and salt dissolve in water, but they bond differently. Use the models to explain how these two substances might be different after they dissolve.

   Sugar is molecular covalent. When sugar dissolves, the solid breaks apart into individual molecules. Salt is an ionic solid. When salt dissolves, it breaks apart into individual ions.

7. Which bonding model would you predict for the following substances? Which are compounds and which are elements?

   a. KI, potassium iodide ionic; compound

   b. CO_2, carbon dioxide gas molecular covalent; compound

   c. Au, gold metallic; element

   d. Cl_2, chlorine gas molecular covalent; element

8. Which of the bonding models are found in elemental substances? Explain, using examples.

   All but the ionic model of bonding are found in elemental substances. Diamond, copper, and oxygen gas exhibit three different types of bonding, but each involves only one type of atom.

9. **Making Sense** If you have the chemical formula of a substance, what can you figure out about its properties? Explain. Use the compound silver nitrate, $AgNO_3$, as an example.

   You can figure out the type of bonding in the substance and from there something about its properties, such as hardness, phase, solubility, and conductivity. Silver nitrate is an ionic substance because it has a metal bonded to nonmetal atoms. It is a brittle solid that will dissolve in water, conduct electricity once it is dissolved, and form ions in solution.

Chemistry Worksheet
Balancing Reactions

Name: KEY
Block: _____

Balance the chemical equations below:

1. 2 $Li\,(s)$ + 1 $MgBr_2\,(aq)$ → 1 $Mg(s)$ + 2 $LiBr\,(aq)$

2. 1 $AlCl_3\,(aq)$ + 3 $AgNO_3\,(aq)$ → 1 $Al(NO_3)_3\,(aq)$ + 3 $AgCl\,(s)$

3. 4 $Na\,(s)$ + 1 $O_2\,(g)$ → 2 $Na_2O\,(s)$

4. 2 $H_2O\,(l)$ → 2 $H_2\,(g)$ + 1 $O_2\,(g)$

5. 1 $Ba(NO_3)_2\,(aq)$ + 1 $K_2SO_4\,(aq)$ → 1 $BaSO_4\,(s)$ + 2 $KNO_3\,(aq)$

6. 2 $KClO_3\,(s)$ → 2 $KCl\,(s)$ + 3 $O_2\,(g)$

7. 3 $CuCO_3\,(aq)$ + 2 $Al\,(s)$ → 1 $Al_2(CO_3)_3\,(aq)$ + 3 $Cu\,(s)$

8. 2 $Mg\,(s)$ + 1 $O_2\,(g)$ → 2 $MgO\,(s)$

9. 1 $C_2H_5OH\,(l)$ + 3 $O_2\,(g)$ → 2 $CO_2\,(g)$ + 3 $H_2O\,(g)$

10. 2 $HF\,(aq)$ + 1 $Ca(OH)_2\,(aq)$ → 2 $H_2O\,(aq)$ + 1 $CaF_2\,(aq)$

Chemistry Worksheet

Name: KEY

Nomenclature

Block: _____

I. Names and Charges of Monatomic Ions (excluding those derived from transition and post transition elements):

	Name of ion	Metallic ion or non-metallic ion	Formula
a.	magnesium ion	metallic	Mg^{2+}
b.	potassium ion	metallic	K^{+}
c.	iodide	non-metallic	I^{-}
d.	oxide	non-metallic	O^{2-}
e.	calcium ion	metallic	Ca^{2+}
f.	phosphide	non-metallic	P^{3-}
g.	chloride	non-metallic	Cl^{-}
h.	selenide	non-metallic	Se^{2-}
i.	lithium ion	metallic	Li^{+}
j.	bromide	non-metallic	Br^{-}
k.	barium ion	metallic	Ba^{2+}
l.	nitride	non-metallic	N^{3-}
m.	strontium ion	metallic	Sr^{2+}
n.	lithium ion	metallic	Li^{+}
o.	sulfide	non-metallic	S^{2-}
p.	oxidide	non-metallic	O^{2-}
q.	cesium ion	metallic	Cs^{+}
r.	hydride	non-metallic	H^{-}
s.	rubidium ion	metallic	Rb^{+}

II. Fill in the Blanks

Positive ions, also known as cations, are derived from metals, while negative ions, also known as anions, are derived from nonmetals.

Chemistry Worksheet Name: KEY

Nomenclature Block: _____

III. Naming and Empirical Formulas for Binary Ionic Compounds

a.	Sodium bromide	NaBr	n.	Li_3N	lithium nitride
b.	Calcium chloride	$CaCl_2$	o.	K_2S	potassium selenide
c.	Sodium sulfide	Na_2S	p.	$BaCl_2$	barium chloride
d.	Magnesium sulfide	MgS	q.	AgI	Silver iodide
e.	Potassium iodide	KI	r.	$PbCl_2$	lead (II) chloride
f.	Aluminum fluoride	AlF_3	s.	Na_2O	sodium oxide
g.	Aluminum oxide	Al_2O_3	t.	Mg_3P_2	magnesium phosphide
h.	Calcium oxide	CaO	u.	$MgBr_2$	magnesium bromide
i.	Potassium oxide	K_2O	v.	Fe_2O_3	iron (III) oxide
j.	Iron (II) chloride	$FeCl_2$	w.	LiCl	lithium chloride
k.	Silver iodide	AgI	x.	PbO_2	lead (IV) oxide
l.	Mercury (I) sulfide	Hg_2S	y.	CuS	copper (II) sulfide
m.	Iron (III) bromide	$FeBr_3$	z.	FeO	iron (II) oxide

IV. Naming and Empirical Formulas for Ternary Ionic Compounds

a.	Ammonium chloride	NH_4Cl	j.	$AgClO_3$	Silver
b.	Ammonium sulfide	$(NH_4)_2S$	k.	KOH	potassium hydroxide
c.	Sodium hydroxide	NaOH	l.	KNO_3	potassium nitrate
d.	Magnesium sulfate	$MgSO_4$	m.	$BaSO_4$	barium sulfate
e.	Sodium phosphate	Na_3PO_4	n.	KCl	potassium chloride
f.	Aluminum sulfate	Al_2S_3	o.	$CaBr_2$	calcium bromide
g.	Aluminum phosphate	AlP	p.	Na_2O	Sodium oxide
h.	Calcium carbonate	$CaCO_3$	q.	$Mg_3(PO_4)_2$	magnesium phosphate
i.	Potassium nitrate	KNO_3	r.	$Al_2(CO_3)_3$	aluminum carbonate

LESSON 21 ACTIVITY

Salty Eights
Formulas for Ionic Compounds

Name _____

Date _____ Period _____

Purpose

To practice creating and naming ionic compounds.

Instructions

1. Use the cards to play Salty Eights. List your compounds in the table. If you use more than one atom of an element, put the number in the formula (example: Li_2S—lithium sulfide).
2. Name the compounds (change the ending of the second element to "-ide.")

Cation	Anion	Compound formula	Compound name	Point value
Mg^{2+}	Cl^-	$MgCl_2$	magnesium chloride	40
Mg^{2+}	O^{2-}	MgO	magnesium oxide	10

Total: ____

3. **Bonus Question** Determine the compound with the highest point value you could make with these cards. Name that compound.

Compounds with five cards have the highest number of points (e.g., aluminum oxide, Al_2O_3, and magnesium nitride, Mg_3N_2).

Chemistry Worksheet
Nomenclature in Reactions

Name: _____
Block: KEY

Write out a complete sentence to describe each balanced reaction below:

1. $2\ Li\ (s) + MgBr_2\ (aq) \rightarrow Mg(s) + 2\ LiBr\ (aq)$
   word equation
   solid lithium and aqueous magnesium bromide react to form solid magnesium and aqueous lithium bromide.

2. $AlCl_3\ (aq) + 3\ AgNO_3\ (aq) \rightarrow Al(NO_3)_3\ (aq) + 3\ AgCl\ (s)$

   word equation
   aqueous aluminum chloride and aqueous silver nitrate react to form aqueous aluminum nitrate and solid silver chloride.

3. $4\ Na\ (s) + O_2\ (g) \rightarrow 2\ Na_2O\ (s)$
   word equation
   solid sodium and gaseous oxygen react to form solid sodium oxide.

4. $2\ H_2O\ (l) \rightarrow 2\ H_2\ (g) + O_2\ (g)$
   word equation
   liquid water decomposes to form hydrogen and oxygen gas.

5. $Ba(NO_3)_2\ (aq) + K_2SO_4\ (aq) \rightarrow BaSO_4\ (s) + 2\ KNO_3\ (aq)$
   word equation
   aqueous barium nitrate and aqueous potassium sulfate react to form solid barium sulfate and aqueous potassium nitrate.

6. $2\ KClO_3\ (s) \rightarrow 2\ KCl\ (s) + 3\ O_2\ (g)$
   word equation
   solid potassium chlorate decomposes to form solid potassium chloride and oxygen gas.

7. $3\ CuCO_3\ (aq) + 2\ Al\ (s) \rightarrow Al_2(CO_3)_3\ (aq) + 3\ Cu\ (s)$
   word equation
   aqueous copper (II) carbonate and solid aluminum react to form aqueous aluminum carbonate and solid copper.

8. $2\ Mg\ (s) + O_2\ (g) \rightarrow 2\ MgO\ (s)$
   word equation
   solid magnesium and gaseous oxygen react to form solid magnesium oxide.

9. $C_2H_5OH\ (l) + 3\ O_2\ (g) \rightarrow 2\ CO_2\ (g) + 3\ H_2O\ (g)$
   word equation
   liquid ethanol reacts with oxygen gas to form gaseous carbon dioxide and steam.

10. $2\ HF\ (aq) + Ca(OH)_2\ (aq) \rightarrow 2\ H_2O\ (l) + CaF_2\ (aq)$

    word equation
    hydrofluoric acid reacts with aqueous calcium hydroxide to form water and aqueous calcium fluoride.

KEY

Naming acids

Rules

If the anion ends in …	**the acid name ends in …**
- ide	**hydro – ic**
- ate	**- ic**
- ite	**- ous**

1. nitric acid HNO_3
2. perchloric acid $HClO_4$
3. hydrochloric acid HCl
4. sulfous acid H_2SO_3
5. dichromic acid $H_2Cr_2O_7$
6. carbonic acid H_2CO_3
7. acetic acid $HC_2H_3O_2$
8. H_3P hydrophosphoric acid
9. HNO_2 nitrous acid
10. HClO hypochlorous acid
11. H_2MnO_4 permanganic acid
12. HCN hydrocyanic acid

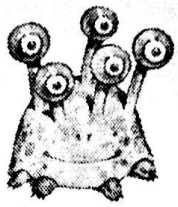
LESSON 22 ACTIVITY

Isn't It Ionic?

Polyatomic Ions

Name _____

Date _____ Period _____



Purpose

To practice creating ionic compounds that contain polyatomic ions.

Instructions

1. Use the cards to play Ionic Grid. Keep track of your compounds and points in this table.

	Cation	Anion	Chemical name	Chemical formula	Points
Example	Mg^{2+}	SO_4^{2-}	magnesium sulfate	$MgSO_4$	2
1	Ca^{2+}	NO_3^-	calcium nitrate	$Ca(NO_3)_2$	3
2	K^+	CO_3^{2-}	potassium carbonate	K_2CO_3	3
3	Ca^{2+}	SO_4^{2-}	calcium sulfate	$CaSO_4$	2
4	NH_4^+	Cl^-	ammonium chloride	NH_4Cl	2
5	Na^+	PO_4^{3-}	sodium phosphate	Na_3PO_4	4
6	$Wild^{2+}(Mg^{2+})$	CO_3^{2-}	magnesium carbonate	$MgCO_3$	2
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

Total: ____

2. Play Three-Minute Bonding. Use the table to keep track of your compounds and points. **The chemical formula must be correct in order for you to get any points.**

	Cation	Anion	Chemical name	Chemical formula	Points
Example	Mg^{2+}	SO_4^{2-}	magnesium sulfate	$MgSO_4$	2
1	K^+	OH^-	potassium hydroxide	KOH	2
2	K^+	NO_3^-	potassium nitrate	KNO_3	2
3	K^+	Cl^-	potassium chloride	KCl	2
4	K^+	CO_3^{2-}	potassium carbonate	K_2CO_3	3
5	K^+	SO_4^{2-}	potassium sulfate	K_2SO_4	3
6	Ca^{2+}	SO_4^{2-}	calcium sulfate	$CaSO_4$	2
7	Na^+	PO_4^{3-}	sodium phosphate	Na_3PO_4	4
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					

Total:

3. Making Sense Another common polyatomic ion is chromate, CrO_4^{2-}. Write the chemical formulas of sodium chromate and calcium chromate.

Sodium chromate is Na_2CrO_4.
Calcium chromate is $CaCrO_4$.