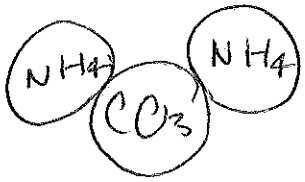
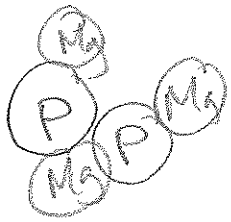
Name: _____ Date: _____ ANSWER KEY 8.1

Writing and Visualizing Chemical Formulas

1. Draw a visual representation of the following compounds.

$(NH_4)_2CO_3$	
Al_2O_3	
Mg_3P_2	
FeF_2	
$KHCO_3$	
Na_2SO_4	

Show the correct number of each ion but these are not really exactly what the molecules look like

Name: KEY Date: 8.1

Writing and Visualizing Chemical Formulas (continued)

2. Write a chemical formula for each combination of ions.

Ions combined		Formula
1 calcium Ca^{2+}	1 carbonate CO_3^{2-}	$CaCO_3$
1 lead Pb^{2+} Pb^{4+}	2 nitrate NO_3^{1-}	$Pb(NO_3)_2$
2 lithium Li^{1+}	1 sulfate SO_4^{2-}	Li_2SO_4
1 chromium Cr^{3+} Cr^{2+}	1 phosphate PO_4^{3-}	$CrPO_4$
1 magnesium Mg^{2+}	1 carbonate CO_3^{2-}	$MgCO_3$
3 chromium Cr^{3+} Cr^{2+}	2 phosphate PO_4^{3-}	$Cr_3(PO_4)_2$
2 sodium Na^{1+}	1 carbonate CO_3^{2-}	Na_2CO_3
1 ammonium NH_4^{1+}	1 hydroxide OH^{1-}	NH_4OH
1 barium Ba^{2+}	1 oxide O^{2-}	BaO
1 barium Ba^{2+}	2 nitrate NO_3^{1-}	$Ba(NO_3)_2$
1 aluminum Al^{3+}	3 fluoride F^{1-}	AlF_3
1 lead Pb^{2+} Pb^{4+}	4 chloride Cl^{1-}	$PbCl_4$
3 lead Pb^{2+} Pb^{4+}	4 phosphate PO_4^{3+}	$Pb_3(PO_4)_4$
3 sodium Na^{1+}	1 phosphide P^{3-}	Na_3P
2 lithium Li^{1+}	1 oxide O^{2-}	Li_2O

Name: _____ Date: _____ 8.2

Writing Formulas for Ionic Compounds

Write the formula for the compound.

1.	zinc bromide Zn^{2+} Br^{1-}	$ZnBr_2$	21.	copper(II) chloride Cu^{2+} Cl^{1-}	$CuCl_2$
2.	sodium oxide Na^{1+} O^{2-}	Na_2O	22.	iron(III) oxide Fe^{3+} O^{2-}	Fe_2O_3
3.	lithium hydroxide Li^{1+} OH^{1-}	$LiOH$	23.	manganese(II) nitrate Mn^{2+} NO_3^{1-}	$Mn(NO_3)_2$
4.	calcium fluoride Ca^{2+} F^{1-}	CaF_2	24.	lead(IV) bromide Pb^{4+} Br^{1-}	$PbBr_4$
5.	silver sulfide Ag^{1+} S^{2-}	Ag_2S	25.	chromium(III) carbonate Cr^{3+} CO_3^{2-}	$Cr_2(CO_3)_3$
6.	ammonium sulfide NH_4^{1+} S^{2-}	$(NH_4)_2S$	26. ☆	tin(IV) chromate Sn^{4+} CrO_4^{2-}	$Sn(CrO_4)_2$
7. ☆	magnesium oxalate Mg^{2+} $C_2O_4^{2-}$	MgC_2O_4	27.	lead(II) sulfate Pb^{2+} SO_4^{2-}	$PbSO_4$
8.	barium sulfate Ba^{2+} SO_4^{2-}	$BaSO_4$	28. ☆	ammonium permanganate NH_4^{1+} MnO_4^{1-}	NH_4MnO_4
9. ☆	potassium chlorite K^{1+} ClO_2^{1-}	$KClO_2$	29. ☆	silver oxalate Ag^{1+} $C_2O_4^{2-}$	$Ag_2C_2O_4$
10.	aluminum nitrate Al^{3+} NO_3^{1-}	$Al(NO_3)_3$	30.	iron(III) hydroxide Fe^{3+} OH^{1-}	$Fe(OH)_3$
11. ☆	ammonium dichromate NH_4^{1+} $Cr_2O_7^{2-}$	$(NH_4)_2Cr_2O_7$	31.	manganese(IV) phosphate Mn^{4+} PO_4^{3-}	$Mn_3(PO_4)_4$
12. ☆	silver acetate Ag^{1+} $C_2H_3O_2^{1-}$	$AgC_2H_3O_2$	32.	iron(II) nitrate Fe^{2+} NO_3^{1-}	$Fe(NO_3)_2$
13. ☆	sodium chromate Na^{1+} CrO_4^{2-}	Na_2CrO_4	33.	copper(II) carbonate Cu^{2+} CO_3^{2-}	$CuCO_3$
14.	lithium sulfide Li^{1+} S^{2-}	Li_2S	34. ☆	zinc chlorate Zn^{2+} ClO_3^{-1}	$Zn(ClO_3)_2$
15. ☆	aluminum chlorate Al^{3+} ClO_3^{1-}	$Al(ClO_3)_3$	35.	iron(II) oxide Fe^{2+} O^{2-}	FeO
16.	calcium nitrate Ca^{2+} NO_3^{1-}	$Ca(NO_3)_2$	36.	mercury(II) sulfate Hg^{2+} SO_4^{2-}	$HgSO_4$
17.	ammonium oxide NH_4^{1+} O^{2-}	$(NH_4)_2O$	37.	lead(IV) sulfide Pb^{4+} S^{2-}	PbS_2
18.	potassium sulfide K^{1+} S^{2-}	K_2S	38.	iron(III) carbonate Fe^{3+} CO_3^{2-}	$Fe_2(CO_3)_3$
19.	silver carbonate Ag^{1+} CO_3^{2-}	Ag_2CO_3	39. ☆	potassium oxalate K^{1+} $C_2O_4^{2-}$	$K_2C_2O_4$
20.	magnesium phosphate Mg^{2+} PO_4^{3-}	$Mg_3(PO_4)_2$	40.	manganese(II) sulfide Mn^{2+} S^{2-}	MnS

Name: _____ Date: _____ 8.3

Naming Ionic Compounds

Key Question: How are ionic compounds named?

Before You Read

Skim the section. On the lines below, predict what your answer will be to the Key Question.

_____

_____

While You Read

As you read, note the ideas you want to remember.

Heading	Ideas to remember
Rules for Naming Iconic Compounds	
Naming Monovalent Metals	Make your own Summary notes
Naming Non-metal Ions	

Name: _____ Date: _____ 8.3

Naming Ionic Compounds (continued)

Heading	Ideas to remember
Naming Polyatomic Ions	
Naming Multivalent Metals	
Determining the Ion Change from a Formula	

Make your own Summary notes

After You Read

Explain how ionic compounds are named. Compare your initial prediction with your answer.

Name: _____ Date: _____ 8.3

Naming Ionic Compounds

Write the name of the compound.

1.	KCl	potassium chloride	21.	Li_2O	lithium oxide
2.	Na_2S	sodium sulfide	22. ☆	$NaCN$	Sodium
3.	$AlCl_3$	aluminum chloride	23. ☆	Ag_2CrO_4	silver chromate
4.	BaO	barium oxide	24. ☆	$Ca(ClO_3)_2$	calcium chlorate
5.	Ag_2S	silver sulfide	25.	NH_4HCO_3	ammonium hydrogen carbonate
6.	Al_2O_3	dilluminum oxide	26.	ZnI_2	zinc iodide
7.	LiF	Lithium fluoride	27. ☆	$KMnO_4$	potassium permanganate
8.	ZnF_2	zinc fluoride	28.	$BaBr_2$	barium bromide
9.	$MgBr_2$	magnesium bromide	29.	$Ca_3(PO_4)_2$	calcium phosphate
10.	CaS	Calcium sulfide	30. ☆	$Na_2Cr_2O_7$	sodium dichromate
11.	KNO_3	potassium nitrate	31.	$LiNO_3$	Lithium nitrate
12.	$MgSO_4$	magnesium sulfate	32.	MgS	magnesium sulfide
13.	$Zn(OH)_2$	zinc hydroxide	33. ☆	$NaClO$	sodium hypochlorite
14.	NH_4I	ammonium iodide	34. ☆	K_2HPO_4	potassium hydrogen phosphate
15.	Na_2CO_3	sodium carbonate	35.	$Ca(OH)_2$	calcium hydroxide
16. ☆	$Mg(HSO_4)_2$	magnesium bisulfate	36.	$(NH_4)_3PO_4$	ammonium phosphate
17.	$AgOH$	silver hydroxide	37. ☆	$Al(H_2PO_4)_3$	Aluminum dihydrogen phosphate
18.	$Zn_3(PO_4)_2$	zinc phosphate	38.	$AgCl$	silver chloride
19.	$(NH_4)_2SO_4$	ammonium sulfate	39.	K_2SO_3	potassium sulphate
20. ☆	$Al(HS)_3$	aluminum	40. ☆	$NaClO_4$	Sodium perchlorate

Name: _____ Date: _____ 8.3

Naming Ionic Compounds with Multivalent Metal Ions

Write the name of the compound.

1.	FeO Fe^{2+} O^{2-}	iron(II) oxide	21.	$Ca(OH)_2$	Calcium(II) hydroxide
2.	SnS_2 S^{2-}	tin(IV) sulfide	22.	$CrCl_3$	chromium(III) chloride
3.	$PbSO_4$	lead(II) sulfate	23.	$CrCO_3$	chromium(II) carbonate
4.	Cr_2S_3 S^{2-}	chromium(III) sulfide	24.	Ag_2SO_4	silver(I) sulfate
5.	$Cu(NO_3)_2$	copper(II) nitrate	25.	NH_4F	ammonium fluoride
6.	$Fe_2(SO_4)_3$	iron(III) sulfate	26.	$Fe_2(Cr_2O_7)_3$	iron(III) dichromate
7.	SnF_2	tin(II) fluoride	27.	PbS	lead(II) sulfide
8.	$HgSO_4$	Mercury(II) sulfate	28. ☆	$Cu(MnO_4)_2$	copper(IV) manganate
9.	$Cu_3(PO_4)_2$	copper(II) phosphate	29.	$Cr_2(SO_4)_3$	chromium(III) sulfate
10. ☆	$Mn(MnO_4)_2$	manganese(II) manganate	30.	CuF_2	copper(II) fluoride
11.	$Fe(OH)_2$	iron(II) hydroxide	31.	$Cr(HCO_3)_3$	chromium(III) bicarbonate
12.	$Pb(CrO_4)_2$	lead(IV) chromate	32.	$FePO_4$	iron(III) phosphate
13.	$CuCl$	copper(I) chloride	33.	Na_2S	sodium sulfide
14.	MnO_2	manganese(IV) oxide	34.	$PbCl_4$	lead(IV) chloride
15.	SnC_2O_4	tin(II) oxalate	35.	$Hg(NO_3)_2$	mercury(II) nitrate
16.	$Fe(ClO_3)_2$	iron(II) chlorate	36.	CrO	chromium(II) oxide
17.	Hg_2Br_2	mercury(I) bromide	37.	$Hg_2(NO_3)_2$	mercury(I) nitrate
18. ☆	$Cu(HS)_2$	copper(II) hydrogen sulfide	38. ☆	CaC_2O_4	calcium oxalate
19.	$Mn(CO_3)_2$	manganese(IV) carbonate	39.	$Ba_3(PO_4)_2$	barium(II) phosphate
20. ☆	$Pb(NO_2)_4$	lead(IV) nitrite	40.	$Sn(SO_4)_2$	tin(IV) sulfate

Name: _____ Date: _____ 8.4

Chemical Families

Key Question: What is a chemical family?

Before You Read

Skim pages 248 to 254. Look at the headings. Read the first and last sentence in each paragraph. Study the figures and read the captions. Look over the questions on page 254. On the lines below, predict what you will learn by reading this section.

_____

_____

While You Read

- As you read, make notes about each chemical family. Tell about their location in the Periodic Table and other information you want to remember. Make notes to explain how you can predict the formulas of compounds.

Family	Ideas to remember
Alkali Metals	
Alkaline Earth Metals	
Halogens	
Noble Gases	
Hydrogen	

Make your own Summaries

Name: _____ Date: _____ 8.4

Chemical Families (continued)

After You Read

Make point-form notes to complete the chart.

	Alkali metals	Alkaline earth metals	Halogens	Noble gases	Hydrogen
Location in the Periodic Table	(left column)	2nd column from left	2nd column from right	column furthest to right	- alone - above Alkali metals
Group Number	1	2 Make your summary	17	Group 18	Group of its own above group 1
Elements Found in the Group	Li, Na, K, Rb, Cs, Fr	Be, Mg, Ca, Sr, Ba, Ra	F, Cl, Br, I, At	gases Ne, He, Kr, Xe, Rn	H
Properties of the Group	- highly reactive - ignites in water - soft, shiny metals	- reaction, but not as reactive as Alkali metals - not soft - shiny metals	- highly reactive - toxic gases	- non-reactive gases	- very highly reactive - ignites easily - can form + or - ions (ions H+ or H-)

Name: _____ Date: _____

CHAPTER 8

Chapter 8 Quiz

Part A: Modified True/False
Indicate whether each statement is true or false. If false, change the underlined word or phrase to make the statement true.

F 1. Sulfur is a member of the alkaline earth metals chemical family. nonmetal

F 2. The ion charge of a member of the alkali metals is 2+. 1+

T 3. Iodine, a toxic purple gas when heated, is a member of the halogens. _____

T 4. The name of the compound NH_4ClO_3 is ammonium chlorate. _____

Beryllium, Magnesium, Calcium, Strontium, Barium, Radium

Part B: Completion
Complete the sentence.

5. A metal reacts with water to form hydrogen gas and is very soft. It is a member of the alkali metal family.

6. A chemical family is a group of elements with similar chemical properties.

7. The ion charge of aluminum is 3+.

8. The ratio of atoms in the compound $Mg(NO_3)_2$ is 1 magnesium atoms to 2 nitrogen atoms to 6 oxygen atoms.

Part C: Multiple Choice
Circle the letter beside the answer that best completes the statement or answers the question.

9. Bromine is a member of this chemical family:
   (a) halogens
   (b) alkali metals
   (c) alkaline earth metals
   (d) noble gases

10. A compound contains 3 nitrate ions for every 1 aluminum ion. The chemical formula is
   (a) $3NO_3Al$
   (b) $(NO_3)_3Al$
   (c) Al_3NO_3
   (d) $Al(NO_3)_3$

11. A metal has only one possible ion charge. Its ion is called a _____ metal ion.
   (a) multivalent
   (b) monovalent
   (c) multicharged
   (d) singly charged

Name: _____ Date: _____

CHAPTER 8

Chapter 8 Quiz (continued)

12. One possible ion of tungsten has an ion charge of 6+. The name of this ion is
    (a) tungsten(6)
    (b) tungsten-6
    (c) tungsten(VI)
    (d) hexatungstide

13. The members of the alkali metals all share these properties:
    (a) hard, react with water to form hydrogen gas, conduct electricity
    (b) soft, react with water to form hydrogen gas, conduct electricity
    (c) unreactive metals, bright colours, toxic
    (d) reactive metals, bright colours, toxic

14. The chemical formula for sodium carbonate is
    (a) $NaCO_3$
    (b) $Na(CO_3)_2$
    (c) Na_2CO_3
    (d) $Na_2(CO_3)$

Na^{1+} CO_3^{2-} ✗ carbonate.

15. The compound KNO_3 is called
    (a) krypton nitroxide
    (b) potassium nitrogen oxide
    (c) potassium nitrogen oxygen
    (d) potassium nitrate

Part D: Short Answer

Use sentences or formulas to answer the following questions.

16. Write the chemical formula for each compound:
    (a) copper(II) chloride $CuCl_2$
    (b) sodium carbonate Na_2CO_3
    (c) iron(III) nitrate NO_3^- $Fe(NO_3)_3$
    (d) ammonium carbonate $(NH_4)_2CO_3$
    (e) lead(IV) bromide $PbBr_4$

17. Write the name for each compound:
    (a) CuI copper (I) iodide
    (b) $Zn(NO_3)_2$ zinc nitrate
    (c) $Mn(CO_3)_2$ manganese (II) carbonate
    (d) $Ca_3(PO_4)_2$ calcium phosphate
    (e) NaF sodium flouride

18. A scientist used electrolysis to separate the elements that make up the compound hydrogen peroxide, H_2O_2, producing hydrogen gas and oxygen gas. What do you expect will be the ratio of the two gases produced?

H_2 + O_2 1:1 ratio

Name: _____ Date: _____

N x 2 P x 1
H x 9 O x 4

CHAPTER 8

Chapter 8 Quiz (continued)

19. Determine the ratio of atoms of each element in the compound ammonium monohydrogen phosphate, $(NH_4)_2HPO_4$.

N x 2 : H x 8 + 1 = 9 hydrogen : P x 1 : O x 4

20. Explain the importance of the Roman numerals in the names of the two compounds copper(I) carbonate and copper(II) carbonate.

CO_3^{2-}

The Roman numeral indicates the charge on the copper ion

Cu_2CO_3 $CuCO_3$

21. If barium and oxygen react in the ratio 1:1, in what ratio will calcium and oxygen react? Explain using the concept of chemical families.

BaO
CaO

Calcium is in the same family as barium (Alkaline earth), so both have the same ion charge.
Ratio Ca : O = 1 : 1

22. Suppose the newly discovered elements "alpha" and "bravo" are in the same chemical family. The compound "alpha chloride" is a white powder that is soluble in water. The compound "bravo carbonate" is a green powder that does not dissolve in water. Predict the colour and solubility of the compounds "bravo chloride" and "alpha carbonate."

white powder, soluble in water

alpha carbonate

green powder, does not dissolve in water

Name: _____ Date: _____

UNIT B

Unit B Quiz

Part A: Modified True/False
Indicate whether each statement is true or false. If false, change the underlined word or phrase to make the statement true.

F 1. The behaviour of a substance as it changes into a new substance is a physical change. chemical change

T 2. Metals share the properties of lustre, electrical and heat conductivity, malleability, and ductility. _____

F 3. Electrons have no charge, have the same mass as protons, and are located in the nucleus of the atom. neutrons

F 4. When an ion is formed, protons will be gained or lost to form negatively or positively charged atoms. electrons

Part B: Sentence Completion
Complete the sentence.

5. A group of elements with similar properties is called a family.

~~6. When the outer shell of an atom is _____, the atom will have become an~~ ion. ? OMIT

7. The atomic theory of Bohr takes into account the unique emission spectra of the elements.

8. A chocolate treat is left too close to a stove element and melts. This is a physical change.

9. Our atmosphere is matter that is best classified as a heterogeneous mixture, because components like clouds and dust are visible.

Part C: Multiple Choice
Circle the letter beside the answer that best completes the statement or answers the question.

10. The two instances of pure substances are
    (a) homogeneous mixtures and compounds
    (b) elements and heterogeneous mixtures
    (c) elements and solutions
    (d) elements and compounds

Name: _____ Date: _____

UNIT B

Unit B Quiz (continued)

11. Soda pop is an example of a(n)
    (a) compound
    (b) homogeneous mixture
    (c) element
    (d) heterogeneous mixture

12. An object has a mass of 1200 g and a volume of 2.0 L (2000 cm^3). What is its density?
    (a) 0.6 g/cm^3 (b) 2400 g/cm^3 (c) 6.0 g/cm^3 (d) 167 g/cm^3

13. Which property of matter is related to the following experiment: small amounts of sugar are each weighed and then added, one at a time, to 100 mL of water until no more can dissolve?
    (a) density (b) malleability (c) reaction with water (d) solubility

14. Which of the following is an example of a chemical change?
    (a) water evaporating
    (b) rain precipitating
    (c) compost decaying
    (d) candle wax melting

15. When frost forms on the grass on a cold morning, this is because of which change of state?
    (a) deposition (b) freezing (c) melting (d) condensing

16. Evaporation is best described as
    (a) the gradual change of state between a liquid and a gas
    (b) the rapid change of state between a gas and a liquid
    (c) the change of state between a solid and a gas
    (d) the rapid change of state between a liquid and a gas

17. Strontium is a shiny element that conducts heat and electricity. It is classified as a
    (a) non-metal (b) metal (c) metalloid (d) solid

18. This man showed that compounds are formed because of the electrical attraction between charged atoms.
    (a) Ernest Rutherford
    (b) John Dalton
    (c) Michael Faraday
    (d) Benjamin Franklin

19. Ions are formed when
    (a) Atoms lose electrons and become positively charged.
    (b) Atoms lose protons and become negatively charged.
    (c) Atoms gain electrons and become positively charged.
    (d) Atoms gain protons and become positively charged.

Name: _____ Date: _____

UNIT B

Unit B Quiz (continued)

Part D: Matching

Chose the letter of the standard notation symbol that matches each of the following:

(b) 20. sodium — (a) $^{23}_{11}S$ — (e) $^{31}_{15}P$

(d) 21. phosphorous ion — (b) $^{23}_{11}Na$ — (f) $^{14}_{6}C$

(g) 22. cobalt ion — (c) $^{12}_{6}C$ — (g) $^{59}_{27}Co^{2+}$

(c) 23. carbon-12 — (d) $^{31}_{15}P^{3-}$

Part E: Short Answer

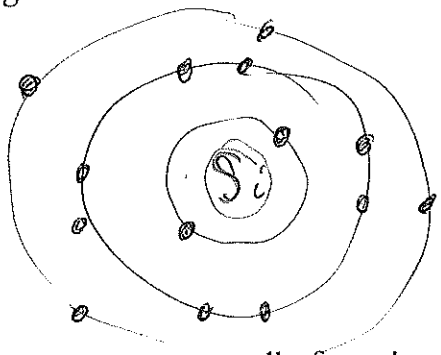
Use sentences, formulas or diagrams to answer the following questions.

24. Look up magnesium in the Periodic Table, and list the following information: the atomic number, the atomic mass, and the ion charge.

atomic number 12 ion charge +2

atomic mass 24.305

25. Draw a Bohr diagram for silicon.



26. Explain why neon does not normally form ions.

neon's valence shell is full with 8 electrons. It is stable

Name: _____ Date: _____

UNIT B

Unit B Quiz (continued)

27. Write the names of the following compounds:

(a) Na_2CO_3 Sodium carbonate

(b) NH_4Cl ammonium chloride

PO_4^{3-} (c) $FePO_4$ iron (III) phosphate

(d) PbO_2 lead (IV) oxide

(e) $Cr_2(CO_3)_3$ chromium carbonate

28. Write the formula for each of the following compounds:

(a) ammonium hydroxide NH_4OH

Mg^{2+} HS^- (b) magnesium hydrogen sulfide $Mg(HS)_2$

CrO_7^{2-} (c) iron(III) dichromate $Fe_2(CrO_7)_3$

(d) potassium chloride KCl

(e) tin(II) oxide SnO

29. Magnesium sulfide does not dissolve easily in water. Predict the solubility of calcium sulfide, and explain your answer.

Since Mg and Ca are in the same family, they have similar properties, So, CaS probably does not dissolve easily in water

30. List the members of the alkali metals chemical family, and give three distinguishing properties of the family.

Lithium
Sodium
potassium
Rubidium
Cesium
Francium

soft (can cut with a knife)
reactive with water (flamable)
shiny