

Writing and Visualizing Chemical Formulas

1. Draw a visual representation of the following compounds.

$(\text{NH}_4)_2\text{CO}_3$	
Al_2O_3	
Mg_3P_2	
FeF_2	
KHCO_3	
Na_2SO_4	

Writing and Visualizing Chemical Formulas (continued)

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

Ions combined		Formula
1 calcium	1 carbonate	
1 lead	2 nitrate	
2 lithium	1 sulfate	
1 chromium	1 phosphate	
1 magnesium	1 carbonate	
3 chromium	2 phosphate	
2 sodium	1 carbonate	
1 ammonium	1 hydroxide	
1 barium	1 oxide	
1 barium	2 nitrate	
1 aluminum	3 fluoride	
1 lead	4 chloride	
3 lead	4 phosphate	
3 sodium	1 phosphide	
2 lithium	1 oxide	

Writing Formulas for Ionic Compounds

Write the formula for the compound.

1.	zinc bromide	21.	copper(II) chloride
2.	sodium oxide	22.	iron(III) oxide
3.	lithium hydroxide	23.	manganese(II) nitrate
4.	calcium fluoride	24.	lead(IV) bromide
5.	silver sulfide	25.	chromium(III) carbonate
6.	ammonium sulfide	26.	tin(IV) chromate
7.	magnesium oxalate	27.	lead(II) sulfate
8.	barium sulfate	28.	ammonium permanganate
9.	potassium chlorite	29.	silver oxalate
10.	aluminum nitrate	30.	iron(III) hydroxide
11.	ammonium dichromate	31.	manganese(IV) phosphate
12.	silver acetate	32.	iron(II) nitrate
13.	sodium chromate	33.	copper(II) carbonate
14.	lithium sulfide	34.	zinc chlorate
15.	aluminum chlorate	35.	iron(II) oxide
16.	calcium nitrate	36.	mercury(II) sulfate
17.	ammonium oxide	37.	lead(IV) sulfide
18.	potassium sulfide	38.	iron(III) carbonate
19.	silver carbonate	39.	potassium oxalate
20.	magnesium phosphate	40.	manganese(II) sulfide

Name: _____ Date: _____

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 Ionic Compounds	
Naming Monovalent Metals	
Naming Non-metal Ions	

Name: _____

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Naming Ionic Compounds (continued)

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

AFTER YOU READ

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

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Naming Ionic Compounds

Write the name of the compound.

1.	KCl	21.	Li_2O
2.	Na_2S	22.	NaCN
3.	AlCl_3	23.	Ag_2CrO_4
4.	BaO	24.	$\text{Ca}(\text{ClO}_3)_2$
5.	Ag_2S	25.	NH_4HCO_3
6.	Al_2O_3	26.	ZnI_2
7.	LiF	27.	KMnO_4
8.	ZnF_2	28.	BaBr_2
9.	MgBr_2	29.	$\text{Ca}_3(\text{PO}_4)_2$
10.	CaS	30.	$\text{Na}_2\text{Cr}_2\text{O}_7$
11.	KNO_3	31.	LiNO_3
12.	MgSO_4	32.	MgS
13.	$\text{Zn}(\text{OH})_2$	33.	NaClO
14.	NH_4I	34.	K_2HPO_4
15.	Na_2CO_3	35.	$\text{Ca}(\text{OH})_2$
16.	$\text{Mg}(\text{HSO}_4)_2$	36.	$(\text{NH}_4)_3\text{PO}_4$
17.	AgOH	37.	$\text{Al}(\text{H}_2\text{PO}_4)_3$
18.	$\text{Zn}_3(\text{PO}_4)_2$	38.	AgCl
19.	$(\text{NH}_4)_2\text{SO}_4$	39.	K_2SO_3
20.	$\text{Al}(\text{HS})_3$	40.	NaClO_4

Naming Ionic Compounds with Multivalent Metal Ions

Write the name of the compound.

1.	FeO	21.	Ca(OH) ₂
2.	SnS ₂	22.	CrCl ₃
3.	PbSO ₄	23.	CrCO ₃
4.	Cr ₂ S ₃	24.	Ag ₂ SO ₄
5.	Cu(NO ₃) ₂	25.	NH ₄ F
6.	Fe ₂ (SO ₄) ₃	26.	Fe ₂ (Cr ₂ O ₇) ₃
7.	SnF ₂	27.	PbS
8.	HgSO ₄	28.	Cu(MnO ₄) ₂
9.	Cu ₃ (PO ₄) ₂	29.	Cr ₂ (SO ₄) ₃
10.	Mn(MnO ₄) ₂	30.	CuF ₂
11.	Fe(OH) ₂	31.	Cr(HCO ₃) ₃
12.	Pb(CrO ₄) ₂	32.	FePO ₄
13.	CuCl	33.	Na ₂ S
14.	MnO ₂	34.	PbCl ₄
15.	SnC ₂ O ₄	35.	Hg(NO ₃) ₂
16.	Fe(ClO ₃) ₂	36.	CrO
17.	Hg ₂ Br ₂	37.	Hg ₂ (NO ₃) ₂
18.	Cu(HS) ₂	38.	CaC ₂ O ₄
19.	Mn(CO ₃) ₂	39.	Ba ₃ (PO ₄) ₂
20.	Pb(NO ₂) ₄	40.	Sn(SO ₄) ₂

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	

Chemical Families (continued)

AFTER YOU READ

Make point-form notes to complete the chart.

Hydrogen				
Noble gases				
Halogens				
Alkaline earth metals				
Alkali metals				
Location in the Periodic Table	Group Number	Elements Found in the Group	Properties of the Group	

Name: _____ Date: _____

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.

- _____ 1. Sulfur is a member of the alkaline earth metals chemical family. _____
- _____ 2. The ion charge of a member of the alkali metals is 2+. _____
- _____ 3. Iodine, a toxic purple gas when heated, is a member of the halogens. _____
- _____ 4. The name of the compound NH_4ClO_3 is ammonium chlorate. _____

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 _____ family.
6. A chemical family is a group of elements with _____ chemical properties.
7. The ion charge of aluminum is _____.
8. The ratio of atoms in the compound $\text{Mg}(\text{NO}_3)_2$ is _____ magnesium atoms to _____ nitrogen atoms to _____ 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 (c) alkaline earth metals
(b) alkali metals (d) noble gases
10. A compound contains 3 nitrate ions for every 1 aluminum ion. The chemical formula is
- (a) $3\text{NO}_3\text{Al}$ (c) Al_3NO_3
(b) $(\text{NO}_3)_3\text{Al}$ (d) $\text{Al}(\text{NO}_3)_3$
11. A metal has only one possible ion charge. Its ion is called a _____ metal ion.
- (a) multivalent (c) multicharged
(b) monovalent (d) singly charged

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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) (c) tungsten(VI)
 (b) tungsten-6 (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 (c) Na_2CO_3
 (b) $\text{Na}(\text{CO}_3)_2$ (d) $\text{Na}_2(\text{CO}_3)$
15. The compound KNO_3 is called
- (a) krypton nitroxide (c) potassium nitrogen oxygen
 (b) potassium nitrogen oxide (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 _____
 (b) sodium carbonate _____
 (c) iron(III) nitrate _____
 (d) ammonium carbonate _____
 (e) lead(IV) bromide _____

17. Write the name for each compound:

- (a) CuI _____
 (b) $\text{Zn}(\text{NO}_3)_2$ _____
 (c) $\text{Mn}(\text{CO}_3)_2$ _____
 (d) $\text{Ca}_3(\text{PO}_4)_2$ _____
 (e) NaF _____

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?

Name: _____

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Chapter 8 Quiz (continued)

19. Determine the ratio of atoms of each element in the compound ammonium monohydrogen phosphate, $(\text{NH}_4)_2\text{HPO}_4$.

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

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.

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."

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.

- _____ 1. The behaviour of a substance as it changes into a new substance is a physical change. _____
- _____ 2. Metals share the properties of lustre, electrical and heat conductivity, malleability, and ductility. _____
- _____ 3. Electrons have no charge, have the same mass as protons, and are located in the nucleus of the atom. _____
- _____ 4. When an ion is formed, protons will be gained or lost to form negatively or positively charged atoms. _____

Part B: Sentence Completion

Complete the sentence.

5. A group of elements with similar properties is called a _____.
6. When the outer shell of an atom is _____, the atom will have become an ion.
7. The atomic theory of _____ 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 _____ change.
9. Our atmosphere is matter that is best classified as a _____, 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

Unit B Quiz (continued)

11. Soda pop is an example of a(n)
- (a) compound (c) element
(b) homogeneous mixture (d) heterogeneous mixture
12. An object has a mass of 1200 g and a volume of 2.0 L (2000 cm³). What is its density?
- (a) 0.6 g/cm³ (b) 2400 g/cm³ (c) 6.0 g/cm³ (d) 167 g/cm³
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 (c) compost decaying
(b) rain precipitating (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 (c) Michael Faraday
(b) John Dalton (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.

Unit B Quiz (continued)**Part D: Matching**

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

- ____ 20. sodium (a) ${}_{11}^{23}\text{S}$ (e) ${}_{15}^{31}\text{P}$
- ____ 21. phosphorous ion (b) ${}_{11}^{23}\text{Na}$ (f) ${}_{6}^{14}\text{C}$
- ____ 22. cobalt ion (c) ${}_{6}^{12}\text{C}$ (g) ${}_{27}^{59}\text{Co}^{2+}$
- ____ 23. carbon-12 (d) ${}_{15}^{31}\text{P}^{3-}$

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.

25. Draw a Bohr diagram for silicon.

26. Explain why neon does not normally form ions.

Unit B Quiz (continued)

27. Write the names of the following compounds:

- (a) Na_2CO_3 _____
- (b) NH_4Cl _____
- (c) FePO_4 _____
- (d) PbO_2 _____
- (e) $\text{Cr}_2(\text{CO}_3)_3$ _____

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

- (a) ammonium hydroxide _____
- (b) magnesium hydrogen sulfide _____
- (c) iron(III) dichromate _____
- (d) potassium chloride _____
- (e) tin(II) oxide _____

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

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

