

Science 10: Chemistry

Chapter 4 Worksheet

Name: _____ Date: _____

Textbook: BC Science 10 McGraw-Hill Ryerson 2008

Section 4.1 Atomic Theory and Bonding

Read pages 168-171

1. What is the electric charge on each of the three subatomic particles?
 - a. Protons _____
 - b. Neutrons _____
 - c. Electrons _____
2. Which two subatomic particles have nearly equal mass?
_____ & _____
3. Which particle determines the nuclear charge? _____
4. Which two subatomic particles are present in equal number in every atom of the same element? _____ & _____

Read pages 171-173

1. What is another name for each row in the periodic table? _____
2. What is another name for each column or group in the periodic table? _____
3. Which group of metals is more reactive, the alkali metals or the alkaline earth metals?

4. List all five halogen elements.

5. Name the first and the last transition metal in period 4.
 - a. First _____ Last _____

Read pages 174-175

Use the periodic table in figure 4.3 on page 172 to help you answer the following questions.

1. Based on the patterns of the periodic table, identify the number of occupied shells for each of the following elements.

a. Calcium, Ca _____

b. Krypton, Kr _____

c. Sulfur, S _____

d. Iodine, I _____

2. Based on the patterns in the periodic table, identify the number of valence electrons for each of the following elements.

a. Chlorine, Cl _____

b. Magnesium, Mg _____

c. Strontium, Sr _____

d. Bromine, Br _____

Draw a Bohr diagram for each of the following.

Beryllium	Carbon	Neon

Read pages 178-180

Use your periodic table to complete the following.

Atomic Name	Atomic Number	Number of Protons	Number of Electrons	Atomic Mass	Number of Neutrons	Number of Occupied Shells
Lithium						
	11					
		19				
			38			
Oxygen						
	9					
		17				
			15			
Iodine						
	52					
		21				
			46			

Section 4.2 Names and Formulas of Compounds

Read pages 184-187

1. Write the names of the following ionic compounds.

- a. Li_3N _____
- b. MgBr_2 _____
- c. Ag_2O _____
- d. RbF _____
- e. AgI _____
- f. AlBr_3 _____
- g. CaI_2 _____
- h. GaI_3 _____
- i. Ag_3N _____
- j. MgSe _____
- k. Ca_3P_2 _____
- l. Na_2O _____
- m. CdS _____
- n. Sr_3P_2 _____
- o. CsF _____

Read page 188

1. Write the formulas of the compounds containing the following ions.

- a. Na^+ with Br^- _____
- b. Zn^{2+} with I^- _____
- c. K^+ with S^{2-} _____

- d. Al^{3+} with S^{2-} _____
- e. Ca^{2+} with O^{2-} _____
- f. Al^{3+} with P^{3-} _____

2. Write the formulas of the following ionic compounds.

- a. Strontium nitride _____
- b. Lithium oxide _____
- c. Silver sulfide _____
- d. Barium phosphide _____
- e. Sodium nitride _____
- f. Potassium selenide _____
- g. Cesium sulfide _____
- h. Aluminum nitride _____
- i. Zinc oxide _____
- j. Aluminum iodide _____
- k. Lithium fluoride _____
- l. Sodium sulfide _____
- m. Zinc phosphide _____
- n. Magnesium chloride _____
- o. Rubidium bromide _____

Read pages 189-190

1. Write the formulas of the following compounds containing multivalent metals.

a. Copper (I) nitride _____

b. Iron (II) phosphide _____

c. Manganese (II) oxide _____

d. Manganese (IV) oxide _____

e. Chromium (II) bromide _____

f. Chromium(III) bromide _____

g. Lead (IV) chloride _____

h. Iron (III) phosphide _____

i. Tin (II) sulfide _____

j. Tin (II) nitride _____

k. Tin (IV) nitride _____

l. Mercury (II) fluoride _____

m. Copper (I) iodide _____

n. Copper (II) iodide _____

o. Copper (II) selenide _____

Read page 191

1. Each of these compounds contains a multivalent metal ion. That means that the name of the metal ion will contain a Roman numeral, which you will need to determine. Write the names of the following compounds.

a. Fe_2O_3 _____

b. PbF_4 _____

c. FeI_2 _____

d. HgI_2 _____

e. Hg_3N_2 _____

f. Sn_3P_4 _____

g. MnS _____

h. MnS_2 _____

i. VCl_5 _____

j. Ni_2S_3 _____

k. NiS _____

l. Mo_2O_3 _____

m. UCl_6 _____

n. ReF_7 _____

o. TiS_2 _____

Read pages 192-193

Refer to Table 4.11, Names, Formulas, and Charges of Some Polyatomic Ions, as you do these problems

1. Write the names of the following compounds with polyatomic ions.

- a. KCH_3COO _____
- b. $\text{Ca}(\text{CH}_3\text{COO})_2$ _____
- c. $(\text{NH}_4)_3\text{P}$ _____
- d. $(\text{NH}_4)_3\text{PO}_4$ _____
- e. $\text{Al}(\text{OH})_3$ _____
- f. $\text{Fe}(\text{OH})_3$ _____
- g. K_2CrO_4 _____
- h. $\text{K}_2\text{Cr}_2\text{O}_7$ _____
- i. $\text{Ca}(\text{HCO}_3)_2$ _____
- j. $\text{Mg}_3(\text{PO}_4)_2$ _____

2. Write the formulas of the following compounds with polyatomic ions.

- a. Potassium permanganate _____
- b. Sodium chromate _____
- c. Ammonium nitrate _____
- d. Lithium hydroxide _____
- e. Aluminum hydroxide _____
- f. Lead (II) perchlorate _____
- g. Iron (III) hydrogen sulfide _____

- h. Vanadium (V) nitrate _____
- i. Magnesium acetate _____
- j. Tin (II) cyanide _____

Read pages 193-195

1. Write the names of the following compounds.

- a. N_2O _____
- b. CO_2 _____
- c. PI_3 _____
- d. PCl_5 _____
- e. SO_2 _____
- f. N_2O_4 _____
- g. P_4S_{10} _____
- h. S_2F_{10} _____
- i. NI_3 _____
- j. NO _____

2. Write the formulas of the following compounds.

- a. Nitrogen tribromide _____
- b. Sulfur hexafluoride _____
- c. Dinitrogen tetrasulfide _____
- d. Oxygen difluoride _____
- e. Carbon tetraiodide _____
- f. Sulfur trioxide _____

- g. Phosphorus pentabromide _____
- h. Diiodine hexachloride _____
- i. Dichlorine monoxide _____
- j. Xenon hexafluoride _____

Video

Watch YouTube Video "What are ionic bonds?" at <https://youtu.be/zpaHPXVR8WU>

Watch YouTube Video "What are covalent bonds?" at <https://youtu.be/h24UmH38 LI>

Read pages 196-197

1. Identify each of the following compounds as either ionic or covalent.

- a. $(\text{NH}_4)_2\text{S}$ _____
- b. OCl_2 _____
- c. SnCl_2 _____
- d. NaNO_3 _____
- e. N_2O_3 _____
- f. SCl_2 _____
- g. NBr_3 _____
- h. FeF_2 _____

2. The compounds in each group below have similar-looking formulas. However, they may have very different names. Some in each group are ionic, while others are covalent.

Classify and name each compound.

- a. VO_2 _____
- NO_2 _____

b. CrBr_2 _____

CdBr_2 _____

SBr_2 _____

c. $\text{Na}_2\text{Cr}_2\text{O}_7$ _____

Na_2CrO_4 _____

Cr_2O_3 _____

N_2O_3 _____

d. SO_3 _____

Li_2SO_3 _____

Li_2SO_4 _____

SO_2 _____

e. OCl_2 _____

BeF_2 _____

FeF_2 _____

f. CO_2 _____

NaHCO_3 _____

PbCO_3 _____

Section 4.3 Chemical Equations

Read pages 202-205

1. What is the definition of a chemical reaction?

2. What are two ways a chemical equation may be written?

a. _____

b. _____

3. What ratio can you determine using the coefficient in a chemical formula?

4. What are the four abbreviations for a compound's state of matter?

a. _____

b. _____

c. _____

d. _____

5. According to the law of conservation of mass, what does the total mass of the products in a chemical reaction equal? _____

Read page 206

Refer to the following balanced chemical equation to answer these questions: $3\text{H}_2 + \text{N}_2 \rightarrow 2\text{NH}_3$

1. List the names of the reactants. _____

- Give the formula of the product. _____
- How many molecules of hydrogen (H₂) will combine exactly with one molecule of nitrogen (N₂)? _____
- How many molecules of nitrogen are required to produce 10 molecules of ammonia (NH₃)? _____
- What is the symbol that means “produces” in a chemical reaction? _____

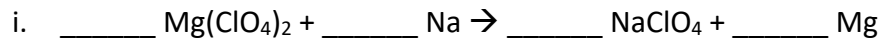
Read page 207

List the total number of each type of atoms in the following reactants.

- 2H₂O + 2NaF H= _____ O= _____ Na= _____ F= _____ .
- 3Br₂ + 2FeI₃ Br= _____ Fe= _____ I= _____ .
- Pb(NO₃)₂ + 2NaI Pb= _____ N= _____ O= _____ Na= _____ I= _____ .
- 2K₃PO₄ + 3(NH₄)₂SO₄ K= _____ P= _____ O= _____ N= _____ H= _____ S= _____ .

Read pages 208-211

- Balance each of the following skeleton equations.
 - _____ NaI + _____ AlCl₃ → _____ NaCl + _____ AlI₃
 - _____ Li + _____ Br₂ → _____ LiBr
 - _____ CH₄ + _____ O₂ → _____ CO₂ + _____ H₂O
 - _____ PbO → _____ Pb + _____ O₂
 - _____ Na₄C + _____ Ca → _____ Na + _____ Ca₂C
 - _____ C₃H₈ + _____ O₂ → _____ CO₂ + _____ H₂O
 - _____ Ca(NO₃)₂ + _____ Cu₂SO₄ → _____ CaSO₄ + _____ CuNO₃
 - _____ NaN₃ → _____ Na + _____ N₂



2. Write the skeleton equation for each of the following reactions. Then balance each of the equations.

a. Nitrogen monoxide + oxygen \rightarrow nitrogen dioxide

b. Iron (III) bromide + sodium hydroxide \rightarrow sodium bromide + iron(III)hydroxide

c. Methane + oxygen \rightarrow carbon dioxide + water

d. Calcium nitrate + potassium carbonate \rightarrow potassium nitrate + calcium carbonate

e. Phosphorus trichloride + chlorine \rightarrow phosphorus pentachloride

f. Potassium permanganate + nickel (II) nitrate \rightarrow potassium nitrate + nickel (II) permanganate

g. Iron + copper(II) chloride \rightarrow iron (II) chloride + copper

h. Sodium phosphate + barium hydroxide \rightarrow sodium hydroxide + barium phosphate
