

CHM 100
Chapter 5 Study Guide / Learning Objectives

Chapter 5 in your textbook deals primarily with what we call nomenclature. In short, you have to know how to name a chemical compound given its formula, and you have to know how to get a compound's chemical formula given its name. In a sense, this is like learning vocabulary in a foreign language course. You need to understand nomenclature to be able to carry on a conversation about chemicals and chemistry.

After completing chapter 5, you should be able to:

[Terminology]

- Define terms related to chemical compounds: ionic compound, monatomic ion, cation, anion, polyatomic ion, chemical formula, molecular compound, binary molecular compound, acid, binary acid, oxyacid.

[Ionic compounds]

- Distinguish, given either the compound's formula or the species it contains, whether a compound is molecular or ionic.
- Describe which elements form cations and which elements form anions.
- Determine the charge on a monatomic main-group (i.e. non transition metal) ion using only a periodic table.
- Give formulas or names for the common polyatomic ions. (i.e. you must *memorize* the list of polyatomic ions given in this study guide)
- Determine the charge on a transition metal ion based on what it is connected to in an ionic compound. (example: What is the charge on Cu in the compound CuO?)

[Molecular compounds]

- Describe differences between molecular and ionic compounds in terms of properties (melting point, etc.) and chemical makeup.

[Nomenclature of ionic compounds]

- Name ionic compounds given their formulas. This will require you to know the polyatomic ions as well as the procedure detailed in the flowchart that you were given in class. You should be able to name compounds with no other reference than a periodic table.
- Write the formulas of ionic compounds given their names. Again, you should be able to do this with only a periodic table as reference.

[Nomenclature of molecular compounds]

- Name molecular compounds given their formulas. This will require you to know the procedure detailed in the flowchart that you were given in class. You are not required to remember the Greek prefixes. Those will be provided to you.
- Write the formulas of molecular compounds given their names.

[Acids]

- Distinguish acids from other compounds based on their chemical formulas.
- Name a binary molecular acid (H + Group VIIA) given its formula.
- Write the formula of a binary molecular acid given its name.
- Name an oxyacid (H + polyatomic ion) given its formula.
- Write the formula of an oxyacid given its name.

[Polyatomic ions]

- You should memorize the names and formulas of these common polyatomic ions.

<i>Formula of ion</i>	<i>Name of ion</i>
$C_2H_3O_2^-$	acetate ion
NH_4^+	ammonium ion
CN^-	cyanide ion
OH^-	hydroxide ion
PO_4^{3-}	phosphate ion
NO_3^-	nitrate ion
NO_2^-	nitrite ion
SO_4^{2-}	sulfate ion
SO_3^{2-}	sulfite ion
HCO_3^-	hydrogen carbonate (bicarbonate) ion
CO_3^{2-}	carbonate ion

[Practice]

- You should practice nomenclature until you are comfortable with it. Flowcharts for naming different classes of compounds are available on the web site and should help you to get started. You need to be proficient in writing names and formulas for ionic compounds, binary molecular compounds, and acids well before the test. Practice until you can name compounds and write formulas for compounds using only a periodic table and the knowledge inside your head. You should be able to work any problem at the end of this chapter. but here is a *minimum* set of problems for you to work: (p136-141 Q&P 10, 12, 14, 18, 20, 22, 36, 40, 44, 46, 50, 58, 92)
- Make flash cards of the polyatomic ions. You must recognize names and formulas of common polyatomic ions to do well when we discuss chemical reactions in chapter 7.