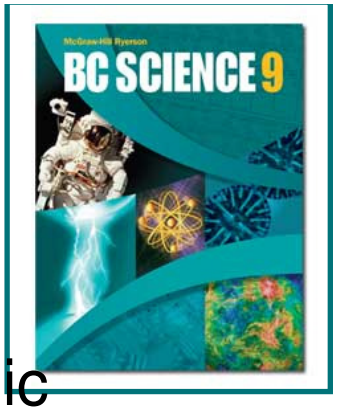
These notes are posted on my site for the following reasons:

- **for students to copy in their own hand-writing**
  - **in order to complete their class notes**
  - **if student did not have enough time in class**
  - **if student was away and missed this section**
- **for assistants and tutors to follow progress of the concepts taught**

Photocopied/printed notes can not be used during the Unit Notebook Check in class.

ndupuis@sd61.bc.ca dupuis.shawbiz.ca

3.2 Names and Formulas of Ionic Compounds

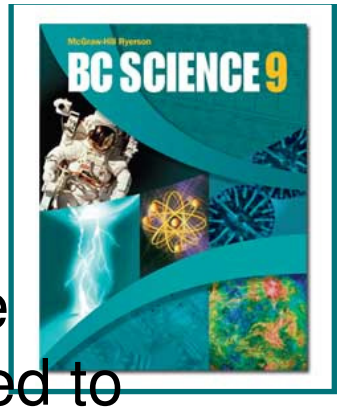


- The chemical name indicates the elements present in the compound. Chemical names for ionic compounds are given according to rules.
  - The positive ion is always the first part of the name
  - The negative ion is always the second part of the name
  - The non-metal ion's name ends with the suffix "-ide"

Examples of Names of Ionic Compounds

Elements Forming the Ionic Compound	Name of the Ionic Compound
calcium and nitrogen	calcium nitride
potassium and oxygen	potassium oxide
lithium and chlorine	lithium chloride
magnesium and sulphur	magnesium sulphide
silver and fluorine	silver fluoride

Ionic Chemical Formulas

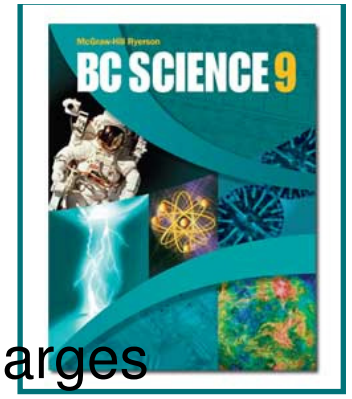


- In an ionic compound, the positive charges balance the negative charges. This balance of charge is used to determine the smallest whole number ratio of + to – ions.

Steps for Writing the Formula	Examples	
	zinc nitride	aluminum chloride
1. Identify each ion and its charge.	zinc: Zn^{2+} nitride: N^{3-}	aluminum: Al^{3+} chloride: Cl^{-}
2. Determine the total charges needed to balance positive with negative.	Zn^{2+}: +2 +2 +2 = +6 N^{3-}: −3 −3 = −6	Al^{3+}: = +3 Cl^{-}: −1 −1 −1 = −3
3. Note the ratio of positive ions to negative ions.	3 Zn^{2+} ions for every 2 N^{3-} ions	1 Al^{3+} ion for every 3 Cl^{-} ions
4. Use subscripts to write the formula. A "1" is not shown in the subscripts.	Zn_3N_2	$AlCl_3$

See page 87

Multivalent Metal Compounds



- Many metals are multivalent, meaning the metals form two or more different positive ions with different charges
- For example, the atom iron forms two ions Fe^{2+} and Fe^{3+}
- Too distinguish different ions for the same metal, roman numerals are added to their name. For example, Fe^{3+} would be named “iron(III)”

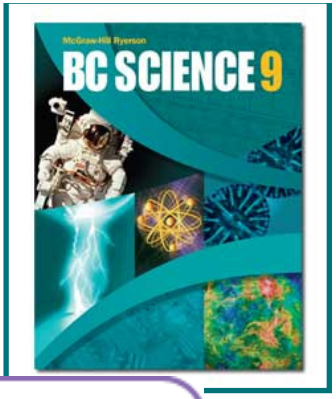
Compounds with Multivalent Metal Ions

Name	Formula
chromium(II) fluoride	CrF_2
chromium(III) fluoride	CrF_3
lead(IV) sulphide	PbS_2
copper(I) phosphide	Cu_3P

Metal Ion Charge	Roman Numeral
1+	I
2+	II
3+	III
4+	IV
5+	V
6+	VI
7+	VII

e page 88

Writing Multivalent Formulas



- Writing ionic compound formulas with multivalent ions follows the same rules as regular ionic compounds

Steps for Writing the Formula	Examples	
	Iron(III) sulphide	Lead(IV) oxide
1. Identify each ion and its charge.	iron(III): Fe^{3+} sulphide: S^{2-}	lead(IV): Pb^{4+} oxide: O^{2-}
2. Determine the total charges needed to balance positive with negative.	Fe^{3+}: +3 +3 = +6 S^{2-} : −2 −2 −2 = −6	Pb^{4+}: = +4 O^{2-}: −2 −2 = −4
3. Note the ratio of positive ions to negative ions.	2 Fe^{3+} ions for every 3 S^{2-} ions	1 Pb^{4+} ion for every 2 O^{2-} ions
4. Use subscripts to write the formula. A "1" is not shown in the subscripts.	Fe_2S_3	PbO_2

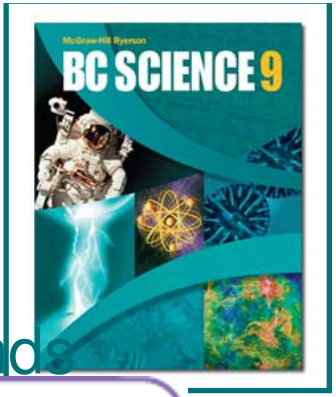
page 89

Multivalent Compound Names

- Steps to writing multivalent compound names are as follows:
  - Identify the metal and verify it forms more than one ion
  - Determine the ratio of ions - for example, Fe_2O_3 means 2 iron ions for every 3 oxygen ions
  - Note the charge on the negative ion: Oxygen is O^{2-}
  - The positive and negative charges must balance, so 2 iron ions of 3+ charge (Fe3+) are needed to balance the 3 oxygen ions
  - Write the name of the compound: Iron(III) oxide

See page 90

Polyatomic Ion Compounds



- Steps to writing names for formulas involving polyatomic ions are similar to other ionic compounds

Steps for Writing the Formula	Examples	
	iron(III) hydroxide	ammonium carbonate
1. Identify each ion and its charge.	iron(III): Fe^{3+} hydroxide: OH^-	ammonium: NH_4^+ carbonate: CO_3^{2-}
2. Determine the total charges needed to balance positive with negative.	Fe^{3+}: $= 3+$ OH^{-1}: $-1\ -1\ -1 = 3-$	NH_4^+: $+1\ +1 = 2+$ CO_3^{2-}: $= 2-$
3. Note the ratio of positive ions to negative ions.	1 Fe^{3+} ion for every 3 OH^- ions	2 NH_4^+ ions for every 1 CO_3^{2-} ion
4. Use subscripts and brackets to write the formula. Omit brackets if only one ion is needed.	$Fe(OH)_3$	$(NH_4)_2CO_3$

Take the Section 3.2 Quiz

See page 91