

2.16 Naming Binary Covalent Compounds

Chemistry 11 - Mrs. Dildy

1. Composed of two nonmetallic elements
2. Made up of molecules, not ions
3. End in -ide
4. Use prefixes to indicate the number of atoms of each element in the name (the name of the first element cannot use the prefix mono).

1 atom: mono-
2 atoms: di-
3 atoms: tri-
4 atoms: tetra-
5 atoms: penta-

6 atoms: hexa
7 atoms: hepta
8 atoms: octa-
9 atoms: nona-
10 atoms: deca-

5. use subscripts to indicate the number of atoms of each element in the formula (never reduce) and may contain the same elements as another compound, but in different proportions.

Examples:

CO (carbon monoxide)
N₂O (dinitrogen monoxide)

CO₂ (carbon dioxide)
N₂O₄ (dinitrogen tetroxide)

A. Write the correct name for:

1) As₄O₁₀ _____

2) BrO₃ _____

3) BN _____

4) N₂O₃ _____

5) NI₃ _____

6) SF₆ _____

7) XeF₄ _____

8) PCl₃ _____

9) CH₄ _____

10) PCl₅ _____

11) P₂O₅ _____

12) S₂Cl₂ _____

13) ICl₂ _____

14) SO₂ _____

15) P₄O₁₀ _____

16) H₂O _____

17) OF₂ _____

18) ClO₂ _____

19) SiO₂ _____

20) BF₃ _____

21) NH₃ _____

22) CO₂ _____

23) SO₃ _____

24) XeF₆ _____

25) KrF₂ _____

26) BrCl₅ _____

27) SCl₄ _____

28) PF₃ _____

29) XeO₃ _____

30) N₂O₄ _____

2.17 Naming Ionic Compounds

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A. Name the following ionic compounds

1.	Li_2O	
2.	MgS	
3.	SrCl_2	
4.	ZrF_4	
5.	Ba_3P_2	
6.	CaBr_2	
7.	LiF	
8.	KI	
9.	Fr_2O	
10.	Cs_3N	
11.	AlCl_3	
12.	Rb_2S	

B. Write the formulas for the following compounds.

	Name	Ions	Formula
1.	Magnesium phosphide		
2.	Sodium bromide		
3.	Lithium nitride		
4.	Barium sulfide		
5.	Gallium iodide		
6.	Silver chloride		
7.	Cesium oxide		
8.	Calcium fluoride		
9.	Zinc bromide		
10.	Lanthanum nitride		
11.	Sodium selenide		
12.	Potassium oxide		

B. Write the correct formula for:

1) chlorine monoxide _____

2) oxygen difluoride _____

3) sulfur hexachloride _____

4) dinitrogen monoxide _____

5) nitrogen trifluoride _____

6) sulfur tetrachloride _____

7) xenon trioxide _____

8) carbon dioxide _____

9) diphosphorous pentoxide _____

10) phosphorous trichloride _____

11) sulfur dioxide _____

12) bromine pentafluoride _____

13) disulfur dichloride _____

14) boron trifluoride _____

15) tetraarsenic decoxide _____

16) silicon tetrachloride _____

17) krypton difluoride _____

18) chlorine monoxide _____

19) silicon dioxide _____

20) boron trichloride _____

21) dinitrogen pentasulfide _____

22) carbon monoxide _____

23) sulfur trioxide _____

24) dinitrogen trioxide _____

25) dinitrogen monoxide _____

26) xenon hexafluoride _____

27) sulfur hexafluoride _____

28) phosphorous pentachloride _____

29) nitrogen monoxide _____

30) phosphorus trichloride _____

2.18 Naming Ionic Compounds – Polyatomic Ions

These are not binary compounds since there are three or more elements present. However each compound still consists of a positive ion and a negative ion.

The names and charges of the polyatomic ions can be found in lists and need not be memorized. It is a good idea, however, to get to know the more common ones introduced in the practice below.

NAME: positive ion + negative ion

COMBINE	IONS (optional)	FORMULA	NAME	NUMBER OF ATOMS
iron (II) & nitrate	Fe^{2+} NO_3^-	$\text{Fe}(\text{NO}_3)_2$	iron (II) nitrate	9
aluminum & nitrate	Al^{3+} NO_3^-	$\text{Al}(\text{NO}_3)_3$	aluminum nitrate	13
sodium & sulfate				
lead (IV) & sulfate				
magnesium & carbonate				
gold (III) & sulfite				
zinc & hydrogen carbonate				
ammonium & nitrate				
copper (I) & phosphate				
silver & hydroxide				
aluminum & hydroxide				
lead (II) & phosphate				
potassium & acetate				
manganese (V) & sulfate				

These are still binary ionic compounds but the metal ions must have their charges specified in their names using Roman Numerals placed in brackets. For example, Fe^{3+} is called iron (III) and Fe^{2+} is called iron (II).

You cannot find the ion's charge from the periodic table because each of these metals can have two or more different kinds of ions. The purpose of the Roman Numeral is to tell you the metal ion's charge.

All the metals on this worksheet must have the Roman Numeral in the name.

NAME: metal + (ROMAN NUMERAL) + non-metal + ide.

COMBINE	IONS (optional)	FORMULA	NAME	NUMBER OF ATOMS
iron (II) & chlorine	Fe^{2+} Cl^-	FeCl_2	iron (II) chloride	3
iron (III) & bromine	Fe^{3+} Br^-	FeBr_3	iron (III) bromide	4
cobalt (II) & fluorine				
lead (IV) & sulfur				
tin (II) & nitrogen				
gold (III) & selenium				
lead (II) & oxygen				
chromium (III) & carbon				
copper (I) & sulfur				
manganese (IV) & oxygen				
tungsten (IV) & nitrogen				
lead (II) & oxygen				
nickel (II) & carbon				
manganese (VII) & fluorine				

1. How is a hydrate different from other chemical compounds?
2. Define the following terms
 - a. Anhydrate
 - b. Dehydration
3. Name the following compounds:
 - a. $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ _____
 - b. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ _____
4. Write the formulas for the following compounds
 - a. Barium chloride dihydrate _____
 - b. Magnesium sulfate heptahydrate _____
5. What is the percent composition of water in the compound in 4b?
6. If 125 grams of magnesium sulfate heptahydrate is completely dehydrated, how many grams of anhydrous magnesium sulfate will remain?

Unit 2 Vocabulary

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Alkali Metals
Alkaline Earth Metals
Atom
Atomic Mass
Atomic Number
Atomic Radii
Binary Ionic
Binary Molecular
Bohr Diagram
Boiling point
Chromatography
Compound
Condensation
Deposition
Distillation
Electron
Element
Evaporation
Filtration
Freezing
Freezing point
Gas Chromatography
Gases
Group
Halogens
Heating Curve
Heterogeneous

Homogeneous
Hydrate
Ionic Substance
Kinetic Energy
Liquid
Mass Number
Matter
Melting
Melting point
Metal
Mixture
Molecular Substance
Molecule
Neutron
Noble gases
Nomenclature
Non metal
Period
Periodic Law
Polyatomic Ion
Proton
Pure Substance
Semi metal
Solid
Solution
Sublimation
Transition Elements
Valence Electrons

THE GOLD DUST KID

The kid mounted his trusty steed, old [B] _____. His shooting [Fe] _____ strapped to his side, he headed out for the bright [Ne] _____ lights of Sabattus, aiming to rob the Litchfield stage. There was sure to be a load of precious [U] _____ aboard, and probably [K] _____, too. Inhaling a deep breath of [O] _____ he coughed on the [S] _____ from the nearby mills. Since the [Hg] _____ was climbing, he quenched his thirst with some H₂O, tasting the [Cl] _____ all big cities like Wales had. As he headed north his bones ached from [Ca] _____ deposits built up over years of riding the [_____] trail. Overhead a [He] _____ filled balloon floated in the breeze; the sun beat down like burning [P] _____.

Soon he spotted the stage, guarded only by a sheriff with a [Sn] _____ badge. "Halt," he yelled, "or I'll fill you full of [Pb] _____." The sheriff drew his gun, but alas, was too slow. The kid's gun, blazing like flaming [Mg] _____ did the [Cu] _____ in. Anyone who drew on the Kid should know his life wasn't worth a plugged [Ni] _____. A [Pt] _____ blonde riding beside the [Al] _____ - framed coach rode for her life when the Kid pulled out some [N] _____ compounds, preparing to blow the safe to atoms.

Suddenly, a shout rang out, "Hi ho [Ag] _____," and a masked man on a white horse raced across the [Si] _____ sands like [Na] _____ skittering on H₂O. A [H] _____ bomb would not have stopped the lawman; the Kid had met his doom. The rest of his life was to be spent behind [Co] _____ steel bars, a warning to all who flirt with danger. Your first detention may be the initial step in a [C] _____ copy life of the saga of the [Au] _____ Dust Kid.



