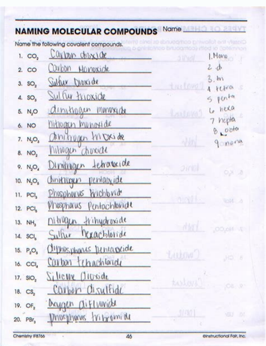
Naming binary molecular compounds worksheet

Name ________________

Date ________________

Ionic Compounds: provide the formula

1. ________ Zinc sulfite
2. ________ Iron (III) chromate
3. ________ Magnesium hydrogen carbonate
4. ________ Iron (II) sulfate
5. ________ Copper (II) cyanide
6. ________ copper (I) chlorate
7. ________ Tin (II) nitrite
8. ________ Mercury (I) nitrate
9. ________ calcium thiosulfate
10. ________ strontium iodide
11. ________ tin (IV) chlorate
12. ________ lithium nitride
13. ________ barium peroxide
14. ________ cadmium chloride
15. ________ magnesium oxalate
16. ________ iron (II) permanganate
17. ________ copper (II) acetate
18. ________ copper (I) sulfate
19. ________ tin (II) cyanide
20. ________ mercury (I) chlorate
21. ________ calcium nitrite
22. ________ strontium nitrate
23. ________ tin (IV) thiosulfate
24. ________ lithium iodide
25. ________ barium chlorite
26. ________ cadmium nitride
27. ________ magnesium peroxide
28. ________ iron (II) chloride
29. ________ copper (II) oxalate
30. ________ cadmium permanganate
31. ________ magnesium acetate
32. ________ mercury (II) thiiocyanate
33. ________ aluminum sulfide
34. ________ chromium (II) dichromate
35. ________ silver hydrogen carbonate
36. ________ ammonium oxide
37. ________ lead (II) bromide
38. ________ sodium phosphate
39. ________ lead (IV) carbonate
40. ________ potassium hydride
41. ________ zinc hydroxide
42. ________ iron (III) fluoride
43. ________ manganese (II) chromate
44. ________ mercury (II) chromate
45. ________ aluminum hydrogen sulfate
46. ________ chromium (II) thiocyanate
47. ________ silver sulfide
48. ________ ammonium dichromate
49. ________ lead (II) hydrogen carbonate
50. ________ sodium oxide
51. ________ lead (IV) bromide
52. ________ potassium phosphate
53. ________ zinc carbonate
54. ________ iron (III) hydride
55. ________ manganese (III) hydroxide
56. ________ mercury (II) fluoride
57. ________ aluminum sulfite
58. ________ lithium bromide
59. ________ ammonium dichromate
60. ________ silver nitrate


NAMING MOLECULAR COMPOUNDS


Name: KEY

15 Pts.

Chemistry Practice: Writing Chemical Formulas

Write a chemical formula for each substance.


Naming Binary Covalent Compounds

Name_____ Period_____ January 7, 2019

Practice Naming Binary Compounds

Why?

When you began chemistry class this year, you probably already knew that the chemical formula for carbon dioxide was CO_2. Today you will find out why CO_2 is named that way. Naming chemical compounds correctly is very important. The slight difference between the names carbon monoxide (CO, a poisonous, deadly gas) and carbon dioxide (CO_2, a greenhouse gas that we exhale when we breathe out) can be the difference between life and death! In this activity you will learn the naming system for molecular compounds.

Part 1 – Naming Binary Covalent Compounds *(Nonmetal + Nonmetal)*

Write the number of atoms of each type of element in the molecular formula.

Molecular Formula	Number of Atoms of First Element	Number of Atoms of Second Element	Name of Compound
ClF			Chlorine monofluoride
ClF_5	1	5	Chlorine pentafluoride
CO			Carbon monoxide
CO_2			Carbon dioxide
Cl_2O			Dichlorine monoxide
PCl_5			Phosphorus pentachlroride
N_2O_5			Dinitrogen pentoxide

Fill in the numbers for each Greek prefix. Write the name of each covalent compound.

Prefix	Numerical Value
mono-	
di-	
tri-	
tetra-	
penta-	
hexa-	
hepta-	
octa-	
nona-	
deca-	

Molecular Formula	Name of Compound
BCl_3	Boron trichloride
SF_6	
IF_7	
NI_3	
N_2O_3	
Cl_2O	
P_4O_{10}	
B_2H_6	
Br_2O_5	
ClF	

Look at the items below. Do you find anything familiar between these compounds? All these compounds are made up of two different types of elements. Such compounds are known as binary compounds. A binary molecular compound comprises two non-metal atoms that are covalently bound together by sharing electrons. Source WHAT ARE BINARY MOLECULAR COMPOUNDS? The term "binary" refers to a substance made up of only two types of materials. The sharing of electrons amongst non-metal atoms is referred to as molecular. Covalent bonding is the sharing of electrons. A compound is a chemical that consists of at least two bound atoms. When we combine all of those phrases, we get a description: a binary molecular compound is composed of two different types of non-metallic atoms covalently bound together by electron sharing. Carbon dioxide, for example, is made up of one carbon atom and two oxygen atoms. Carbon and oxygen are the only elements that are present. These are both non-metallic elements. NAMING BINARY MOLECULAR COMPOUNDS Step 1: When both elements in a compound belong to the same period in the periodic table, the element with the lower group number is mentioned first. Step 2: If the elements belong to two separate periods, the element from the longer time will appear first. The elements should be listed in the correct order in the correct formulations. Step 3: Greek prefixes indicate the number of every element in the combination. They're just placed in front of the element's name they are changing. Step 4: The second element's suffix is removed and replaced with "-ide" Source EXAMPLES OF BINARY MOLECULAR COMPOUNDS CCl_4 = Carbon tetrachloride N_2O_4 = Dinitrogen tetraoxide BBr_3 = Boron tribromide P_3I = Triphosphorus mono iodide NO = Nitrogen monoxide N_2O = Dinitrogen monoxide S_2Cl_2 = Disulfur dichloride Cl_2O_7 = Dichlorine heptoxide CONCLUSION: A binary molecular compound is composed of two different types of non-metallic atoms that are covalently bound together by electron sharing. In binary compound formulations, non-metals are listed in the following order: C, P, N, S, H, Cl, O, F, Br, F. FAQs: 1. How do you know if a molecule is binary? To identify a compound, you must first determine what sort of compound it is by looking at its formula. Metal will always be the first element in the formula for a binary ionic compound, whereas a non-metal will always be the second. 2. What is binary in chemistry? As a reaction between two non-metals, binary molecular compounds are created. Despite the absence of ions, these compounds are termed in the same way as binary ionic compounds. 3. Is H_2O a binary molecule? H_2O is an example of binary compounds. Binary compounds are exactly two components; neither more nor less. We hope you enjoyed studying this lesson and learned something cool about Binary Molecular Compounds! Join our Discord community to get any questions you may have answered and to engage with other students just like you! Don't forget to download our app to experience our fun VR classrooms - we promise it makes studying much more fun! 😎 SOURCES Ionic compounds consist of cations (positive ions) and anions (negative ions). Ionic compound nomenclature or naming is based on the names of the component ions. In all cases, ionic compound naming gives the positively charged cation first, followed by the negatively charged anion. Here are the principal naming conventions for ionic compounds, along with examples to show how they are used: A Roman numeral in parentheses, followed by the name of the element, is used for elements that can form more than one positive ion. There is no space between the element name and the parenthesis. This notation is usually seen with metals since they commonly display more than one oxidation state or valence. You can use a chart to see the possible valences for the elements. Fe2+ Iron(II)Fe3+ Iron(III)Cu+ Copper(I)Cu2+ Copper(II) Example: Fe2O3 is iron(III) oxide. Although Roman numerals are used to denote the ionic charge of cations, it is still common to see and use the endings -ous or -ic. These endings are added to the Latin name of the element (e.g., stannous/stannic for tin) to represent the ions with lesser or greater charge, respectively. The Roman numeral naming convention has wider appeal because many ions have more than two valences. Fe2+ FerrousFe3+ FerricCu+ CuprousCu2+ Cupric Example: FeCl3 is ferric chloride or iron(III) chloride. The -ide ending is added to the name of a monoatomic ion of an element. H- HydrideF- FluorideO2- OxideS2- SulfideN3- NitrideP3- Phosphide Example: Cu3P is copper phosphide or copper(I) phosphide. Some polyatomic anions contain oxygen. These anions are called oxyanions. When an element forms two oxyanions, the one with less oxygen is given a name ending in -ite and the one with more oxygen are given a name that ends in -ate. NO2- NitriteNO3- NitrateSO32- SulfiteSO42- Sulfate Example: KNO2 is potassium nitrite, while KNO3 is potassium nitrate. In the case where there is a series of four oxyanions, the hypo- and per- prefixes are used in conjunction with the -ite and -ate suffixes. The hypo- and per- prefixes indicate less oxygen and more oxygen, respectively. ClO- HypochloriteClO2- ChloriteClO3- ChlorateClO4- Perchlorate Example: The bleaching agent sodium hypochlorite is NaClO. It is also sometimes called the sodium salt of hypochlorous acid. Polyatomic anions sometimes gain one or more H+ ions to form anions of a lower charge. These ions are named by adding the word hydrogen or dihydrogen in front of the name of the anion. It is still common to see and use the older naming convention in which the prefix bi- is used to indicate the addition of a single hydrogen ion. HCO3- Hydrogen carbonate or bicarbonateHSO4- Hydrogen sulfate or bisulfateH2PO4- Dihydrogen phosphate Example: The classic example is the chemical name for water, H2O, which is dihydrogen monoxide or dihydrogen oxide. Dihydrogen dioxide, H2O2, is more commonly called hydrogen dioxide or hydrogen peroxide. Naming binary (two-element) covalent compounds is similar to naming simple ionic compounds. The first element in the formula is simply listed using the name of the element. The second element is named by taking the stem of the element name and adding the suffix -ide. A system of numerical prefixes is used to specify the number of atoms in a molecule. Table \(\PageIndex{1}\) lists these numerical prefixes. Normally, no prefix is added to the first element's name if there is only one atom of the first element in a molecule. If the second element is oxygen, the trailing vowel is usually omitted from the end of a polysyllabic prefix but not a monosyllabic one (that is, we would say "monoxide" rather than "monooxide" and "trioxide" rather than "troxide"). Table \(\PageIndex{1}\): Numerical Prefixes for Naming Binary Covalent Compounds Number of Atoms in Compound Prefix on the Name of the Element 1 mono-* 2 di- 3 tri- 4 tetra- 5 penta- 6 hexa- 7 hepta- 8 octa- 9 nona- 10 deca- *This prefix is not used for the first element's name. Let us practice by naming the compound whose molecular formula is CCl4. The name begins with the name of the first element—carbon. The second element, chlorine, becomes chloride, and we attach the correct numerical prefix ("tetra-") to indicate that the molecule contains four chlorine atoms. Putting these pieces together gives the name carbon tetrachloride for this compound. Example \(\PageIndex{2}\) Write the molecular formula for each compound. chlorine trifluoride phosphorus pentachloride sulfur dioxide dinitrogen pentoxide If there is no numerical prefix on the first element's name, we can assume that there is only one atom of that element in a molecule. ClF3 PCl5 SO2 N2O5 (The di- prefix on nitrogen indicates that two nitrogen atoms are present.) Exercise \(\PageIndex{2}\) Write the molecular formula for each compound. nitrogen dioxide dioxygen difluoride sulfur hexafluoride selenium monoxide Answer a: a. NO2 Answer b: O2F2 Answer c: SF6 Answer d: SeO Because it is so unreactive, sulfur hexafluoride is used as a spark suppressant in electrical devices such as transformers. Example \(\PageIndex{3}\) Write the name for each compound. Solution bromine pentafluoride disulfur difluoride carbon monoxide Exercise \(\PageIndex{3}\) Write the name for each compound. Answer a: carbon tetrafluoride Answer b: selenium dichloride Answer c: sulfur trioxide For some simple covalent compounds, we use common names rather than systematic names. We have already encountered these compounds, but we list them here explicitly: H2O: water NH3: ammonia CH4: methane Methane is the simplest organic compound. Organic compounds are compounds with carbon atoms and are named by a separate nomenclature system that we will introduce in Section 4.6. Identify whether each compound has covalent bonds. Identify whether each compound has covalent bonds. C2H6 C6H5Cl KC2H3O2 Ca(OH)2 Identify whether each compound has ionic bonds, covalent bonds, or both. Identify whether each compound has ionic bonds, covalent bonds, or both. FeCl3 Fe(NO3)3 (NH2)2CO SO3 Which is the correct molecular formula—H4Si or SiH4? Explain. Which is the correct molecular formula—SF6 or F6S? Explain. Write the name for each covalent compound. Write the name for each covalent compound. Write the formula for each covalent compound. iodine trichloride disulfur dibromide arsenic trioxide xenon hexafluoride Write the formula for each covalent compound. boron trichloride carbon dioxide tetraphosphorus decoxide germanium dichloride Write two covalent compounds that have common rather than systematic names. What is the name of the simplest organic compound? What would its name be if it followed the nomenclature for binary covalent compounds? both ionic covalent ionic 4. ionic both covalent covalent SiH4; except for water, hydrogen is almost never listed first in a covalent compound. 6. SF6; the less electronegative atom (S) is written first silicon tetrafluoride nitrogen dioxide carbon disulfide diphosphorus pentoxide 8. carbon monoxide disulfur trioxide boron trifluoride germanium disulfide 10. H2O and NH3 (water and ammonia) (answers will vary) CH4; carbon tetrahydride

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