

Ionic and molecular compounds worksheet answers

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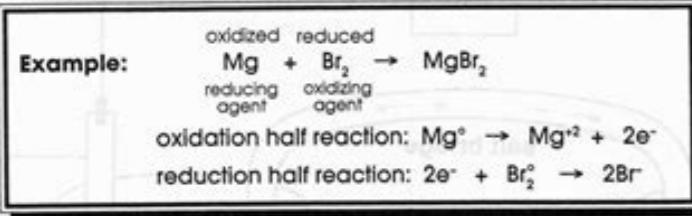
NAMING MOLECULAR COMPOUNDS	
1. CO	carbon dioxide
2. CO ₂	carbon monoxide
3. SO ₂	sulfur dioxide
4. SO ₃	sulfur trioxide
5. N ₂ O ₄	dinitrogen tetroxide (laughing gas)
6. NO ₂	nitrogen monoxide
7. N ₂ O ₃	dinitrogen trioxide
8. NO ₃	nitrogen dioxide
9. H ₂ S	hydrogen sulfide
10. H ₂ O ₂	dihydrogen peroxide
11. PO ₃	phosphorus trioxide
12. PO ₄	phosphate pentoxide
13. S ₂ O ₃	sulfur dithionate (luncheon meat)
14. S ₂ O ₄	sulfur dithiosulfate
15. S ₂ O ₅	sulfur dithiosulfate
16. CO ₃	carbon tetrachloride
17. Cl ₂ O	chlorine dioxide
18. ClO ₂	chlorine dioxide
19. Br ₂ O	bromine tetroxide
20. Br ₂ O ₃	bromine tetroxide

01 L RIG
reducing agent oxidizing agent

Name _____

REDOX REACTIONS

For the equations below, identify the substance oxidized, the substance reduced, the oxidizing agent, the reducing agent, and write the oxidation and reduction half-reactions.



- $2H_2 + O_2 \rightarrow 2H_2O$
 red. $2H_2 \rightarrow 4H^+ + 4e^-$
 oxid. $O_2 + 4e^- \rightarrow 2O^{2-}$
- $Fe + Zn^{2+} \rightarrow Fe^{2+} + Zn$
 red. $Fe \rightarrow Fe^{2+} + 2e^-$
 oxid. $Zn^{2+} + 2e^- \rightarrow Zn$
- $2Al + 3Fe^{2+} \rightarrow 2Al^{3+} + 3Fe$
 red. $2Al \rightarrow 2Al^{3+} + 6e^-$
 oxid. $3Fe^{2+} + 6e^- \rightarrow 3Fe$
- $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$
 red. $Cu \rightarrow Cu^{2+} + 2e^-$
 oxid. $2e^- + 2Ag^+ \rightarrow 2Ag$

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1. What is a binary molecular compound?
 A covalently-bonded compound composed of only two kinds of non-metal elements, that does not start with H (those compounds are acids).

2. In the table below, fill in the prefix corresponding to the number of atoms in the formula:

Number	Prefix	Number	Prefix
1	mono-	6	hexa-
2	di-	7	hepta-
3	tri-	8	octa-
4	tetra-	9	nona-
5	penta-	10	deca-

In the table below, determine the formula of the binary covalent compound or acid from its name, or the name of the compound from the formula.

Name to Formula	Formula to Name
3. antimony tribromide	SbBr ₃
4. iodine pentafluoride	IF ₅
5. dinitrogen trioxide	N ₂ O ₃
6. ammonia	NH ₃
7. phosphorus triiodide	PI ₃
8. carbon monoxide	CO
9. phosphorous pentachloride	PCl ₅
10. tetraiodine nonoxide	I ₄ O ₉
11. bromic acid No hydro, so bromate	HBrO ₃
12. phosphorous acid No hydro, so phosphite	H ₃ PO ₃
13. hydroiodic acid hydro, so iodide	HI
14. P ₄ S ₃	tetraphosphorous pentasulfide
15. SeO ₃	selenium trioxide
16. Si ₂ Br ₆	disilicon hexabromide
17. SCl ₄	sulfur tetrachloride
18. CH ₄	methane
19. NF ₃	nitrogen trifluoride
20. N ₂ O	dinitrogen monoxide
21. IF ₇	iodine heptafluoride
22. HClO	ClO ⁻ = hypochlorite hypoclorous acid
23. HF	F ⁻ = fluoride hydrofluoric acid
24. H ₂ CO ₃	CO ₃ ²⁻ = carbonate carbonic acid

25. What is the difference between a binary acid and an oxyacid? How are each named?
 A binary acid contains H covalently bonded to what looks like a monatomic anion from the periodic table (or a polyatomic anion ending in -ide). An oxyacid contains H covalently bonded to what looks like a polyatomic oxyanion from Table D. The binary acid is named by adding "hydro-" before the root and "-ic acid" after the root of the anion, and oxyacids are named by changing the ending of the anion, either "-ate" to "-ic acid" or "-ite" to "-ous acid".

Model 2 – Prefixes and Suffixes

Prefix	Numerical Value	Molecular Formula	Name of Compound
mono-	1	BCl_3	Boron trichloride
di-	2	SF_6	Sulfur hexafluoride
tri-	3	IF_7	Iodine heptafluoride
tetra-	4	NI_3	Nitrogen triiodide
penta-	5	N_2O_5	Dinitrogen tetroxide
hexa-	6	Cl_2O	Dichlorine monoxide
hepta-	7	P_4O_{10}	Tetraphosphorus decoxide
octa-	8	B_5H_9	Pentaboron nonahydride
nona-	9	Br_5O_3	Tribromine octoxide
deca-	10	ClF	Chlorine monofluoride

5. Examine the prefixes in Model 2. Fill in the numerical value that corresponds to each prefix.

6. What suffix (ending) do all the compound names in Model 2 have in common?

They all end in "ide".

7. Carefully examine the names of the compounds in Model 2. When is a prefix NOT used in front of the name of an element? *(Example: IF₇-iodine heptfluoride)*
When the first element is one. (Example: NI₃-nitrogen triiodide)

8. Consider the compound NO₂.

- a. Which element, nitrogen or oxygen, would require a prefix in the molecule name? Explain.

Oxygen would require a prefix of "mono" because it is the second element and there is one oxygen. Nitrogen does not require a prefix because it is the first element and there is one nitrogen.

- b. Name the molecule NO₂

Nitrogen monoxide (Notice, the "o" of monoxide dropped)
→ Not monooxide

9. Find two compounds in Model 2 that contain a subscript of "4" in their molecular formula.

- a. List the formulas and names for the two compounds.

N_2O_4 - dinitrogen tetroxide || P_4O_{10} - Tetraphosphorus decoxide

6. What is different about the spelling of the prefix meaning "four" in these two names?

- The "e" has been dropped from the end of the word.

The *a* has been dropped from the prefix tetra.

NAMING ACIDS

Name Key

- | | |
|-----------------------------|---------------------------|
| Name the following acids. | |
| 1. HNO_3 | <u>nitric acid</u> |
| 2. HCl | <u>hydrochloric acid</u> |
| 3. H_2SO_4 | <u>sulfuric acid</u> |
| 4. H_3PO_4 | <u>phosphorous acid</u> |
| 5. CH_3COOH | <u>acetic acid</u> |
| 6. HBr | <u>hydrobromic acid</u> |
| 7. HNO_2 | <u>nitrous acid</u> |
| 8. H_3PO_3 | <u>phosphorous acid</u> |
| 9. H_2S | <u>hydrosulfuric acid</u> |
| 10. H_2CO_3 | <u>carbonic acid</u> |

Write the formulas of the following acids

- | | |
|------------------------|--|
| 11. sulfuric acid | <u>H_2SO_4</u> |
| 12. nitric acid | <u>HNO_3</u> |
| 13. hydrochloric acid | <u>HCl</u> |
| 14. acetic acid | <u>$HC_2H_3O_2$</u> or <u>CH_3COOH</u> |
| 15. hydrofluoric acid | <u>HF</u> |
| 16. phosphorous acid | <u>* H_3PO_3</u> |
| 17. carbonic acid | <u>H_2CO_3</u> |
| 18. nitrous acid | <u>HNO_2</u> |
| 19. phosphoric acid | <u>H_3PO_4</u> |
| 20. hydrosulfuric acid | <u>H_2S</u> |

In order to continue enjoying our site, we ask that you confirm your identity as a human. Thank you very much for your cooperation. Compounds A compound is a substance that has two or more chemical elements whose atoms are bonded together. These atoms are chemically bonded in specific ways and in detailed proportions, and the substances cannot be readily separated through simple physical means. There are several different types of compounds, including binary, ionic, molecular, acids, cations, and anions. These types of compounds have different properties and different chemical makeup, but they are the categories that describe the potentially millions of different chemical compounds. Examples of Compounds: 1. Water - Formula: H_2O = Hydrogen₂ + Oxygen Two atoms of the element Hydrogen combine with one atom of Oxygen through a covalent bond to form water. Hydrogen has a slightly positive charge and oxygen has a negative charge, and therefore it forms a polar molecule. Water can be split back into hydrogen and oxygen through electrolysis. 2. Hydrogen Peroxide - Formula: H_2O_2 = Hydrogen₂ + Oxygen₂ Hydrogen peroxide is formed when two atoms of hydrogen form a bond with two atoms of oxygen that have bonded to each other. Although it has only one more oxygen atom than is present in a molecule of water (H_2O), its properties are very different. 3. Salt - Formula: $NaCl$ = Sodium + Chlorine In salt, one atom of sodium bonds to one atom of chlorine to produce the resulting ionic compound sodium chloride. Salt is quite easily produced for commercial uses by simply evaporating seawater, although it can be mined from the ground as well. Sodium chloride can be separated into its different atoms through electrolysis. 4. Baking Soda - Formula: $NaHCO_3$ = Sodium + Hydrogen + Carbon + Oxygen₃ Sodium bicarbonate (baking soda) can be produced from the reaction of carbon dioxide with an aqueous solution of sodium hydroxide, which creates sodium carbonate; it is then combined with carbon dioxide molecules to produce sodium bicarbonate. It is found naturally in hot springs and other places on earth, but is commercially produced for industrial uses. 5. Octane - Formula: C_8H_{18} = Carbon₈ + Hydrogen₁₈ Octane is a hydrocarbon whose actual formula is $CH_3(CH_2)_6CH_3$. It's a low-molecular weight compound, which means its highly volatile and flammable, making it ideally suited for the production of gasoline.

Compounds Examples CHEMISTRY 12 UNIT 4 ACIDS, BASES AND SALTS - OUTLINE DETAILED NOTES ON BRONSTED - LOWRY THEORY (TUTORIAL 14) Tutorial 14-Solutions (WORD) Arrhenius Theory VIDEO Brønsted-Lowry Theory VIDEO DETAILED NOTES ON STRONG AND WEAK ACIDS AND ACID BASE EQUILIBRIA (Unit 4 p 1-12) Strong Acids and Bases VIDEO Weak Acids VIDEO Weak Bases VIDEO Conjugate Acids and Bases VIDEO Working With Acid-Base Equilibria Example 1 VIDEO Working with Acid-Base Equilibria Example 2 (Amphiprotic Ions) VIDEO Working with Acid-Base Equilibria Example 3 (Salts) VIDEO Using Acid-Base Equilibria to Rank Acids VIDEO DETAILED NOTES ON IONIZATION OF WATER, K_w , K_a , K_b , pH, pOH CALCULATIONS (Unit 4 notes p. 13-31) Ionization of Water VIDEO How Temperature Affects Ionization of Water VIDEO Notes on Water and Temperature Changes Ionization of Water in Acidic and Basic Solutions VIDEO pH and Hydronium Ion Concentration VIDEO pH and Relative Acidity of Solutions VIDEO Dilution Problems with pH VIDEO Notes on Mass of base & dilution pH problems pOH and Hydroxide Ion Concentration VIDEO Working with $[H_3O^+]$, $[OH^-]$, pH and pOH VIDEO $[H_3O^+]$, $[OH^-]$, pH and pOH Calculations Example 1 VIDEO Effect of Temperature on pH, pOH, pK_w , and Neutrality VIDEO Calculations Involving Water Not at $25^\circ C$ Example 2 VIDEO SUMMARY OF pH, pOH CALCULATIONS Notes on Comparing Solubility in Acid, Bases, and Salts Introduction to K_a for Weak Acids VIDEO K_a to pH and Percent Ionization VIDEO pH and Acid Concentration to K_a VIDEO pH and K_a to Initial Acid Concentration VIDEO Introduction to K_b for Weak Bases VIDEO Finding the pH of a Weak Base VIDEO pH and Base Concentration to K_b VIDEO pH and K_b to Initial Base Concentration VIDEO Finding pH of a Weak Acid VIDEO CALCULATING THE HYDROXIDE ION CONCENTRATION $[OH^-]$ IN A STRONG ACID - Video WHICH K_b REPRESENTS THE BASE WITH THE STRONGEST CONJUGATE ACID? - Video DETAILED NOTES ON HYDROLYSIS, ACIDIC AND BASIC OXIDES (ANHYDRIDES), ACID RAIN, TITRATIONS AND INDICATORS (UNIT 4 NOTES P. 32-53) Acid and Base Hydrolysis VIDEO Hydrolysis of Cations VIDEO Hydrolysis of Anions VIDEO Hydrolysis of Salts VIDEO Hydrolysis of Amphiprotic Anions VIDEO Introducing Metal and Non-metal Oxides VIDEO Metal Oxides VIDEO Non-metal Oxides VIDEO Oxides and Acid Rain VIDEO Balancing Neutralization Equations VIDEO Formula, Complete Ionic, and Net Ionic Equations for Neutralization VIDEO Acid-Base Titration Part 1 $\frac{1}{2}$ Finding Unknown Concentration of an Acid VIDEO Acid-Base Titration Part 2 $\frac{1}{2}$ Determining Percent Composition of Vinegar VIDEO Acid-Base Indicators $\frac{1}{2}$ How They Work VIDEO Using Indicators to Find Approximate pH VIDEO The Transition Point of an Indicator VIDEO DETAILED NOTES ON PRIMARY STANDARDS, pH OF ACID-BASE MIXTURES, TITRATION CURVES AND BUFFER SOLUTIONS (UNIT 4 NOTES P. 54-77) Strong Acid $\frac{1}{2}$ Strong Base Mixtures VIDEO Strong Acid-Strong Base Mixture Calculations Example 1 VIDEO Strong Acid $\frac{1}{2}$ Strong Base Titration Curves VIDEO Strong Acid $\frac{1}{2}$ Weak Base Titration Curves VIDEO Weak Acid $\frac{1}{2}$ Strong Base Titration Curves VIDEO Buffer Solutions-Definition and Preparation VIDEO Buffer Solutions and How They Work $\frac{1}{2}$ Part 1 Adding an Acid VIDEO Buffer Solutions and How They Work $\frac{1}{2}$ Part 1 Adding a Base VIDEO Titration Simulation Site SOME REVIEW OF UNIT 4-2 (ACIDS, BASES AND SALTS) andriano_cz / Getty Images Electrochemical reactions involve the transfer of electrons. Mass and charge are conserved when balancing these reactions, but you need to know which atoms are oxidized and which atoms are reduced during the reaction. Oxidation numbers are used to keep track of how many electrons are lost or gained by each atom. These oxidation numbers are assigned using the following rules. The convention is that the cation is written first in a formula, followed by the anion. For example, in NaH , the H is H^- ; in HCl , the H is H^+ . The oxidation number of a free element is always 0. The atoms in He and N_2 , for example, have oxidation numbers of 0. The oxidation number of a monatomic ion equals the charge of the ion. For example, the oxidation number of Na^+ is +1; the oxidation number of N_3^- is -3. The usual oxidation number of hydrogen is +1. The oxidation number of hydrogen is -1 in compounds containing elements that are less electronegative than hydrogen, as in CaH_2 . The oxidation number of oxygen in compounds is usually -2. Exceptions include OF_2 because F is more electronegative than O, and BaO_2 , due to the structure of the peroxide ion, which is $[O-O]^{2-}$. The oxidation number of a Group IA element in a compound is +1. The oxidation number of a Group IIA element in a compound is +2. The oxidation number of a Group VIIA element in a compound is -1, except when that element is combined with one having a higher electronegativity. The oxidation number of Cl is -1 in HCl , but the oxidation number of Cl is +1 in $HOCl$. The sum of the oxidation numbers of all of the atoms in a neutral compound is 0. The sum of the oxidation numbers in a polyatomic ion is equal to the charge of the ion. For example, the sum of the oxidation numbers for SO_4^{2-} is -2.

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