Science 9

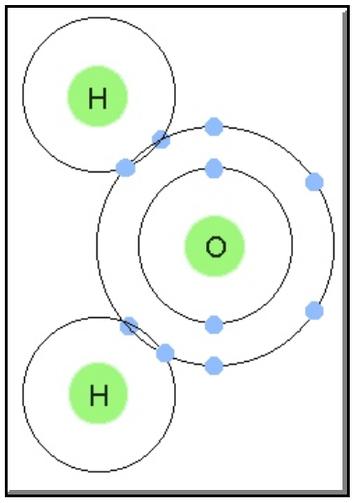
Unit 2: Chemical Reactions

Worksheet 13: Covalent Bonds

Covalent Bonding:

- results from sharing electrons between the atoms.
- Usually found between non metals
- Forms molecular compounds
- Examples H_2O , CO_2 , O_2

The diagram below illustrates how the valence electrons are shared between hydrogen and oxygen to form water:



PART 1: NAMING MOLECULAR COMPOUNDS :

1. Common names Of molecular compounds

(i) sucrose or table sugar $C_{12}H_{22}O_{11}$

(ii) carbon dioxide CO_2

(iii) carbon monoxide CO

(iv) methane CH_4

(v) water H_2O

2. Diatomic Molecules (Remember gen)

oxygen		O_2
hydrogen		H_2
nitrogen		N_2
The Halogens (group 17)	fluorine	F_2
	chlorine	Cl_2
	bromine	Br_2
	iodine	I_2

3. Naming Binary Molecular Compounds

You must know this list (first ten prefixes) in order to convert formula to names or to convert names to formulas

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

i) Name the first element that appears in the formula.

ii) Name the second element that appears in the formula, changing its ending to –ide.

iii) Use prefixes to indicate the number of atoms of each element in the molecular formula

Note:

The prefix mono- is generally omitted for the first element.

For ease of pronunciation, we usually eliminate the last letter of a prefix that ends in “o” or “a” when naming an oxide

Examples:

CCl_4 carbon tetrachloride

SiO_2 silicon dioxide

P_4S_3 tetraphosphorus trisulfide

PART 2: WRITING FORMULAS FOR MOLECULAR COMPOUNDS

To write a formula for a molecular compound, just follow the directions indicated by the prefixes in the name of the compound. The prefixes tell you the number of atoms of the element in the compound.

nitrogen dioxide NO_2

nitrogen triiodide NI_3

triphosphorus pentabromide P_3Br_5

PART A: Multiple Choice

1. How is a molecular/covalent compound formed?

   (A) formed when elements are combined
   (B) formed when non metals gain electrons
   (C) formed when metal atoms share electrons to complete the outer shell
   (D) formed when non-metal atoms share electrons to complete the outer shell

2. Covalent Bonds are formed between

   (A) Ions
   (B) metal atoms
   (C) nonmetal atoms
   (D) compounds

3. Why do two nonmetals generally form covalent bonds with one another?

   (A) They have similar sizes
   (B) They have similar properties
   (C) Nonmetals prefer to share electrons rather than transfer them
   (D) None of the above

4. Which of the following compounds is held together by covalent bonds?

   (A) NaCl
   (B) $CaBr_2$
   (C) NH_3
   (D) FeO

5. Fluorine, chlorine, bromine, and iodine are part of a family called

   (A) alkali metals.
   (B) semimetals.
   (C) halogens.
   (D) inert gases

6. What is the correct name for the compound IBr_3?

   (A) iodine bromate
   (B) iodine tribromide
   (C) iodine tribromine
   (D) monoiodine tribromite

7. What is the correct name for the compound S_2Cl_2?

   (A) disulfur chlorate
   (B) disulfur dichloride
   (C) disulfur dichlorine
   (D) sulfur chloride

8. simple volcano demonstration in a science fair project requires that vinegar be mixed with baking soda. The result is bubbling and fizzing. The carbon dioxide produced in this reaction is the most accurately written as:

   (A) CO_2
   (B) $CO_{2(g)}$
   (C) $CO_{2(s)}$)
   (D) $CO_{2(l)}$

9. H_2O is the chemical formula of

(A) Water
(B) Salt
(C) Sugar
(D) Rust

10. The name dinitrogen tetroxide tells you that this compound contains:

(A) two nitrogen atoms and two oxygen atoms
(B) four nitrogen atoms and two oxygen atoms
(C) two nitrogen atoms and four oxygen atoms
(D) four nitrogen atoms and four oxygen atoms

PART B: WRITTEN RESPONSE

1. Write the formulas for the following compounds in the space provided

a) carbon dioxide			k) nitrogen monoxide	
b) silicon dioxide			l) tetraphosphorus decoxide	
c) water			m) silicon carbide	
d) carbon disulfide			n) petaflorine noniodide	
e) nitrogen trihydride			o) diphosphorus pentabromide	
f) carbon tetrachloride			p) arsenic tribromide	
g) diphosphorus pentasulfide			q) carbon monoxide	
h) dinitrogen tetroxide			r) sulfur dioxide	
i) fluorine			s) neon	
j) diphosphorus trioxide			t) dinitrogen tetroxide	

2. Write the names for the following compounds, in the space provided.

a) CBr_4			k) N_2O	
b) I_2			l) C_3N_4	
c) PF_3			m) P_2O_5	
d) N_2O_4			n) Ar	
e) CO			o) P_4	
f)N_2H_3			p) ClO_2	
g) H_2O_2			q) $SiCl_2$	
h) SCl_6			r) BH_3	
i) SO_3			s) C_2S_4	
j) P_4O_6			t) OF_2	