The National Orthodox School Shmaisani

Science Worksheet #6

Chemical Bonding

Name: _____ Grade **8 ( )**

Date: **/5/2023**

Ionic Bonding Practice

1. What are valence electrons?

Electrons located in the outermost shell of an atom.

2. Why are valence electrons important?

They determine how atoms react in a chemical reaction.

3. How can you tell how many valence electrons an element has?

Using the periodic table, find the group number of the element.

4. Between what types of elements do ionic bonds form? **Metals and non-metals.**

5. What happens to valence electrons when ionic bonds are formed?

Electrons are transferred between atoms (lost or gained)

6. Why are cations positive?

They lose valence electrons, so they have more positive protons.

7. Why are anions negative?

They gain valence electrons, so they have more negative charges.

8.Referring to the periodic table, find the charge of the following:

	Na	Se	Ca	Mg	Al	I	P	O
Ion formed	**Na^{+1}**	**Se^{-2}**	**Ca^{+2}**	**Mg^{+2}**	**Al^{+3}**	**I^{-1}**	**P^{-3}**	**O^{-2}**
Cation or Anion?	**Cation**	**Anion**	**Cation**	**Cation**	**Cation**	**Anion**	**Anion**	**Anion**

9. Do chemical formulas have a charge even though they may be made from ions? Why?

No, because ionic compounds must be electrically neutral; the positive and negative charges cancel each other.

10. What are the 2 purposes of subscripts in chemical formulas?

Describes the types of atoms and their numbers in an element or compound.

11. Write good chemical formulas for each of the following combinations of elements: (use the periodic table to find the valency of the elements)

Lithium & Chlorine

LiCl

Cesium & Fluorine

CsF

Potassium & Oxygen

K_2O

Rubidium & Sulfur

Rb_2S

Calcium & Bromine

$CaBr_2$

Barium & Iodine

BaI_2

Magnesium & Sulfur

MgS

Strontium & Oxygen

SrO

Covalent Bonding Practice

1. Describe how a covalent bond forms.

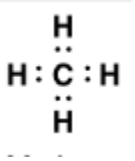
In covalent bonds, valence electrons are shared between atoms.

2. Covalent bonds form between what kinds of elements? **Non-metals**

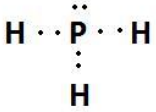
3. For each element, draw the Lewis dots diagram (based on valence electrons).

4. For each compound, draw the Lewis dot diagram.

a) CH_4



b) PH_3

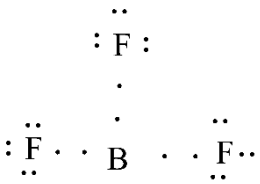


c) H_2O

d) Br_2

e) N_2

f) BF_3

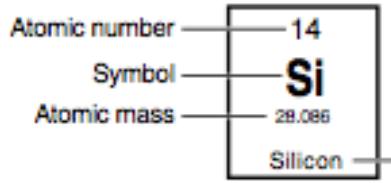


Types of Chemical Bonds

a. Classify the following as ionic (metal + nonmetal) or covalent (nonmetal + nonmetal).
*b. Determine the charge for each element or polyatomic ion in each **ionic** compound.*

1. $CaCl_2$ **ionic/ Ca^{+2} Cl^{-1}**
2. CO_2 **covalent**
3. H_2O **covalent**
4. $BaSO_4$ **both**
5. K_2O **ionic/ K^{+1} O^{-2}**
6. NaF **ionic/ Na^{+1} F^{-1}**
7. Na_2CO_3 **both/ Na^{+1} CO_3^{-2}**
8. CH_4 **covalent**
9. SO_3 **covalent**
10. LiBr **ionic/ Li^{+1} Br^{-1}**
11. MgO **ionic/ Mg^{+2} O^{-2}**
12. NH_4Cl **both**
13. HCl **covalent**
14. KI **ionic/ K^{+1} I^{-1}**
15. NaOH **both / Na^{+1} OH^{-1}**
16. NO_2 **covalent**
17. $AlPO_4$ **both/ Al^{+3} PO_4^{-3}**
18. $FeCl_3$ **ionic/ Fe^{+3} Cl^{-1}**
19. P_2O_5 **covalent**
20. N_2O_3 **covalent**

Periodic Table of the Elements



Group 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H 1.008 Hydrogen																	2 He 4.0026 Helium
3 Li 6.941 Lithium	4 Be 9.012 Beryllium											5 B 10.81 Boron	6 C 12.011 Carbon	7 N 14.007 Nitrogen	8 O 15.999 Oxygen	9 F 18.998 Fluorine	10 Ne 20.179 Neon
11 Na 22.990 Sodium	12 Mg 24.305 Magnesium											13 Al 26.982 Aluminium	14 Si 28.086 Silicon	15 P 30.974 Phosphorus	16 S 32.066 Sulfur	17 Cl 35.453 Chlorine	18 Ar 39.948 Argon
19 K 39.098 Potassium	20 Ca 40.08 Calcium	21 Sc 44.956 Scandium	22 Ti 47.88 Titanium	23 V 50.942 Vanadium	24 Cr 51.996 Chromium	25 Mn 54.938 Manganese	26 Fe 55.847 Iron	27 Co 58.933 Cobalt	28 Ni 58.69 Nickel	29 Cu 63.546 Copper	30 Zn 65.39 Zinc	31 Ga 69.72 Gallium	32 Ge 72.61 Germanium	33 As 74.922 Arsenic	34 Se 78.96 Selenium	35 Br 79.904 Bromine	36 Kr 83.80 Krypton
37 Rb 85.468 Rubidium	38 Sr 87.62 Strontium	39 Y 88.906 Yttrium	40 Zr 91.224 Zirconium	41 Nb 92.906 Niobium	42 Mo 95.94 Molybdenum	43 Tc (98) Technetium	44 Ru 101.07 Ruthenium	45 Rh 102.906 Rhodium	46 Pd 106.42 Palladium	47 Ag 107.868 Silver	48 Cd 112.41 Cadmium	49 In 114.82 Indium	50 Sn 118.71 Tin	51 Sb 121.763 Antimony	52 Te 127.60 Tellurium	53 I 126.904 Iodine	54 Xe 131.29 Xenon
55 Cs 132.905 Cesium	56 Ba 137.33 Barium	57 La 138.906 Lanthanum	72 Hf 178.49 Hafnium	73 Ta 180.948 Tantalum	74 W 183.84 Tungsten	75 Re 186.207 Rhenium	76 Os 190.23 Osmium	77 Ir 192.22 Iridium	78 Pt 195.08 Platinum	79 Au 196.967 Gold	80 Hg 200.59 Mercury	81 Tl 204.383 Thallium	82 Pb 207.2 Lead	83 Bi 208.980 Bismuth	84 Po (209) Polonium	85 At (210) Astatine	86 Rn (222) Radon
87 Fr (223) Francium	88 Ra 226.025 Radium	89 Ac 227.028 Actinium	104 Rf (261) Rutherfordium	105 Db (262) Dubnium	106 Sg (263) Seaborgium	107 Bh (262) Bohrium	108 Hs (265) Hassium	109 Mt (266) Meitnerium	110 (269)								

Mass numbers in parentheses are those of the most stable or most common isotope.

Lanthanide Series	58 Ce 140.12 Cerium	59 Pr 140.908 Praseodymium	60 Nd 144.24 Neodymium	61 Pm (145) Promethium	62 Sm 150.36 Samarium	63 Eu 151.97 Europium	64 Gd 157.25 Gadolinium	65 Tb 158.925 Terbium	66 Dy 162.50 Dysprosium	67 Ho 164.930 Holmium	68 Er 167.26 Erbium	69 Tm 168.934 Thulium	70 Yb 173.04 Ytterbium	71 Lu 174.967 Lutetium
Actinide Series	90 Th 232.038 Thorium	91 Pa 231.036 Protactinium	92 U 238.029 Uranium	93 Np 237.048 Neptunium	94 Pu (244) Plutonium	95 Am (243) Americium	96 Cm (247) Curium	97 Bk (247) Berkelium	98 Cf (251) Californium	99 Es (252) Einsteinium	100 Fm (257) Fermium	101 Md (258) Mendelevium	102 No (259) Nobelium	103 Lr (262) Lawrencium