***Study Guide for Chemistry Part II Test***

***Chemical Bonds***

-Elements bond with other elements because they want their electron shells (energy levels) to be full.

-***Octet Rule*** states that most atoms need 8 electrons in their outer shells to be full and “happy.”

-***Metals*** (left side of Periodic Table) lose their extra electrons and have positive charges. Example:



Gain or lose electrons? \_\_\_\_\_\_\_\_\_ Gain or lose electrons? \_\_\_\_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Charge \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Nonmetals*** (located to the right of the “staircase”) usually gain electrons to fill their shells. Example:



Gain or lose electrons? \_\_\_\_\_\_\_\_\_ Gain or lose electrons? \_\_\_\_\_\_\_\_\_

Charge \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Charge \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

-***Ionic bonds*** usually form when metals transfer electron(s) to nonmetals. Ions are formed! Example:

Na transfers 1 electron to F

 Ionic compounds:

 \*are solid at room temperature

 \* are good conductors of electricity

 \*break up in water; ex. Salt (NaCl) in water

***Covalent bonds*** usually form when nonmetals share electron(s) so that each have 8 (except for Hydrogen). See example of Cl2:



Covalent compounds:

 \*are liquid or gas at room temperature

 \* are poor conductors of electricity

 \*do not break up in water; ex. Carbon dioxide (CO2) bubbles in water

Identify each compound below as ionic or covalent. Refer to the Periodic Table to determine metals/nonmetals:

a). Li2O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ d). KOH \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b). C6H12O6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ e). H2O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c). NaHCO3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ f). CO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Draw the Lewis Dot Structure for each compound below and state whether it shows an ionic or covalent bond. ONLY SHOW THE VALENCE (OUTER) ELECTRONS FOR EACH ATOM.

|  |  |  |
| --- | --- | --- |
| **Compound** | **Dot Structure** | **Ionic or Covalent?** |
| CH4 (methane) |  |  |
| LiOH |  |  |
| N2 |  |  |
| Na2S |  |  |

***Balancing Equations***

1. What is the Law of Conservation of Matter? How does this relate to balancing equations?

-Circle the equations that are ALREADY BALANCED from the examples below

**1)** Na + Cl2 🡪 NaCl 2Na + Cl2 🡪 2NaCl 2Na + Cl2 🡪 2NaCl

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2)** Ca + Cl2 🡪 CaCl2  2Ca + Cl2 🡪 2CaCl2  Ca + 2Cl2 🡪 4CaCl2

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**3)** FeCl2 + K2S 🡪 FeS + KCl FeCl2 + K2S 🡪 FeS + 2KCl 2FeCl2 + K2S 🡪 2FeS + 2KCl

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4)** 2C2H2 + 5O2 CO2 + 2H2O   2CH4 + 5O2 2CO2 + 4H2O  2C4H10 + 13O2 8CO2 + 10H2O 

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**5)** UO2 + HF 🡪 UF4 + H2O UO2 +4 HF 🡪 UF4 + 2H2O 2UO2 + 4HF 🡪 UF4 + 4H2O

***Acids and Bases***

1. What is the pH scale used to measure? What does pH stand for?
2. Write in where each of the following belongs on the pH scale below: ***strong acids, strong bases, weak acids, weak bases, neutral***

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***Acids***

-range in pH from 0-6.9

-sour if tasted

-good electrolytes (conduct electricity)

-produce H+ ions in water

***Bases***

-range in pH from 7.1-14

-bitter if tasted

-good electrolytes (conduct electricity)

-produce OH- ions in water

Matching

\_\_\_\_\_1). Baking soda a. acid

\_\_\_\_\_2). Taste sour b. base

\_\_\_\_\_3). Are slippery c. both a and b

\_\_\_\_\_4). Taste bitter d. neutral substance

\_\_\_\_\_5). vinegar

\_\_\_\_\_6). Produce hydroxide (OH-) ions in water

\_\_\_\_\_7). Produce Hydrogen (H+) ions in water

\_\_\_\_\_8). pure water

\_\_\_\_\_9). Naturally occurring rain

\_\_\_\_\_10). Can be very dangerous if used incorrectly

***Neutralization***

When you mix an acid with a base, you form a neutral salt and water.

-The H+ (from acid) combines with the OH- (from base) to form water.

-The remaining parts make up the salt. Find their charges and write them as a neutral compound (criss cross). See example:

H2SO4 + KOH 🡪 \_\_\_H20\_\_\_\_\_\_\_\_\_\_ + \_\_\_ K2SO4\_\_\_\_\_\_\_\_\_\_

H2*SO4* + *KO*H

Form H2O + K has +1 charge SO4 has -2 charge, so:

K2SO4 (Criss Cross)

Write the **balanced** equation for these neutralization reactions: (remember to balance charges for ionic compounds!)

a) HCl + NaOH 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) HNO3 + KOH🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) Ca(OH)2 + H2SO4🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d) Mg(OH)2 + H3PO4🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e) H2C2O4 + Ca(OH)2 🡪 CaC2O4 + \_\_\_\_\_\_\_\_\_\_\_\_\_

***Extra Practice***

For more balancing equations practice, visit <http://education.jlab.org/elementbalancing/index.html> or scan the QR code below

For more info on acids and bases visit <http://chem4kids.com/files/react_acidbase.html> or scan the QR code below.

For more info on ionic and covalent bonding, visit <http://chem4kids.com/files/atom_bonds.html> or scan the QR code below.

