**1. Ionic Bonds**

***EQ: What are ionic bonds, and how are they formed?***

**Computer Lab: Ionic Bonds**

Go to <http://www.pbslearningmedia.org/asset/lsps07_int_ionicbonding/> (or Google Search: “ionic bonds online activity” to find <http://www.pbslearningmedia.org/resource/lsps07.sci.phys.matter.ionicbonding/ionic-bonding/>). Read each screen and follow the directions where appropriate. You will also need to answer the questions on the following screens:

#1 Ionic bonds form between \_\_\_\_\_\_\_\_\_\_\_\_\_ and involve the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of electrons.

#5 In order to build an ionic compound that will stick together, you’ll need both a

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ion and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ion.

#6 The positive ion is usually a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

#7 The negative ion is usually a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

#12 The two ions are held together by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

#22 What is the formula for the compound on this screen? \_\_\_\_\_\_\_\_\_\_\_

#24 What is the number of Ca ions? \_\_\_\_\_\_\_ What is the number of F ions? \_\_\_\_\_\_\_

#25 What is the formula for the compound on this screen? \_\_\_\_\_\_\_\_\_\_\_

**Packed Sphere Structures** - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Draw at least 4 cations for each structure.*

NaCl MgF2

**2. Covalent Bonds**

***EQ: What are polar and nonpolar covalent bonds, and how are they formed?***

**Computer Lab: Covalent Bonds**

Go to <http://www.pbslearningmedia.org/asset/lsps07_int_covalentbond/> (or Google Search: “covalent bonds online activity” to find <http://www.pbslearningmedia.org/resource/lsps07.sci.phys.matter.covalentbond/covalent-bonding/>). Read each screen and follow the directions where appropriate. You will also need to answer the questions on the following screens:

#1 A covalent bond is a bond that forms when atoms are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons.

#3 Answer the questions on this screen.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#9 In a covalent bond, the atoms are not really \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons as much as they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over them.

#11 What types of elements form covalent bonds? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#12 Covalent bonds will form between two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Each of the

nonmetal atoms will have a strong attraction for the other atom’s

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but will also tend to hold onto its own \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

#24 What is the weakest type of bond? (Circle one.)

 Single Double Triple

 What is the strongest type of bond? (Circle one.)

 Single Double Triple

**3. Intermolecular Forces**

***EQ: What forces hold MOLECULES together?***

**Computer Lab: Intermolecular Forces**

Go to <https://www.wisc-online.com/LearningContent/gch6804/index.html> (or Google Search: “intermolecular forces wisc online” to find <https://www.wisc-online.com/learn/natural-science/chemistry/gch6804/intermolecular-forces>). Read each screen and follow the directions where appropriate. You will also need to answer the questions on the following screens:

#2 The strongest intermolecular forces between molecules are less than \_\_\_\_\_\_\_\_\_\_ as strong

 as the bonds between atoms.

 Intermolecular forces cause a substance to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_ phases.

#3 **Dipole-dipole forces** result from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

#4 **London Dispersion Forces:** The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of electrons causes

 an instantaneous dipole. There is an attraction between these temporary dipoles.

#5 **London Disperson Forces:** *Every* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ experiences

 London forces. The strength of these forces increases as the atomic or molecular weight increases.

**3. Intermolecular Forces (cont.)**

#8 **Hydrogen Bonding** occurs between molecules that have a hydrogen atom bonded to a more electronegative \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, or \_\_\_\_\_\_\_ atom. Hydrogen bonds are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than London and dipole-dipole forces, but weaker than covalent bonds.

***Problems:***

1. Using your Periodic Table of Electronegativities, identify the type of bonding (polar or nonpolar) that occurs between the following molecules.
2. Using the Bond Type, check the boxes of the forces that occur between these molecules.

 **Intermolecular Forces**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Molecule** | **Bond Type****(PC or NPC)** | **LD*****very weak*** | **D-D*****weak*** | **HB*****moderate*** |
| H2 |  |  |  |  |
| H2O |  |  |  |  |
| SO2 |  |  |  |  |
| HF |  |  |  |  |
| CI4 |  |  |  |  |
| PCl3 |  |  |  |  |
| ClBr |  |  |  |  |
| NH3 |  |  |  |  |
| BH3 |  |  |  |  |
| SeO2 |  |  |  |  |

1. Which of the compounds above would you expect to have the HIGHEST boiling points?