**Chemistry**

**YOUR CHOICES + YOUR ACTIONS = YOUR FUTURE!!!**

**Packet# 4**

* **Intermolecular Forces**
* **The Mole and Empirical Formula**

(BRING THIS WITH YOU TO EVERY CLASS)

*“Success is not the result of spontaneous combustion. You must set yourself on fire.”*

Class Website: http://mrgchem.weebly.com

Mr. Gutierrez’s email: mr.brgutierrez@gmail.com



*Note: You are expected to work on this packet during the allotted class practice time.*

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| **Packet** | **Followed All Classroom Policies** | **Class work Participation** |
| /35 | Completed Class Notes | /20 | Monday | /20 |
| /35 | Completed Classwork | /20 | Tuesday | /20 |
| /5 | Writing Name on Every Page | /20 | Wednesday | /20 |
| /25 | Handed Packet in on Time  | /20 | Thursday | /20 |
| /100 | Total Points | /20 | Friday | /20 |
|  |  | /100 | Total Points | /100 |

Name of Chemist:

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Period: \_\_\_\_\_\_\_\_\_\_\_

*\*All Classnotes + Questions MUST be finished for HOMEWORK if not done in class (whether we got through it all or not).\**

***DUE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objectives: SWBAT describe the electron-sea model of metallic bonding.** **SWBAT describe the three main types of intermolecular forces.**  |

**Metallic Bonding**

**Metallic bonding is**

**Properties of Metals**

1. Good conductor of heat and electricity
2. Malleable (can be hammered into thin sheets)
3. Shiny
* Metals are good conductors of heat and electricity because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Intermolecular Forces**

**Intermolecular Forces are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**A dipole** is formed by opposite charges separated by a distance. The more electronegative atom will have a charge of delta negative (δ-) and the less electronegative atom will have a charge of delta positive (δ+).

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**Hydrogen Bonding** is attraction between a hydrogen atom in a hydrogen-containing compound and an electronegative atom. Compounds must have the following bonds present in order to participate in hydrogen bonding: H-N, H-F, H-O. Examples of compounds that experience hydrogen bonding: H2O, NH3, HF.

***Review:***

Electronegativity is an atom’s ability to attract electrons. Electronegativity of elements increases across the period and decreases down the group in the Periodic Table.

**Other Intermolecular Forces (Supplementary Material)**

* **Dipole-dipole:** forces of attraction between polar molecules. Molecules experiencing dipole-dipole forces tend to have higher boiling points.
* **London Dispersion:** forces of attraction resulting from constant motion of electrons that create an instantaneous dipole. These occur between noble gas atoms and nonpolar molecules.

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objective: SWBAT describe the electron-sea model of metallic bonding.** **SWBAT describe the three main types of intermolecular forces.** |

1. Why are metals good conductors of heat and electricity?
2. Which of the following best describes what occurs in metallic bonding?
3. Electrons are localized into one region of the atom
4. Electrons are floating inside the nucleus
5. Electrons are move in the direction of least repulsions
6. Electrons freely move throughout empty atomic orbitals in a network of metal atoms
7. Define dipole.
8. True or false. Compounds that can participate in hydrogen bonding tend to have higher melting and boiling points.
9. Draw the two Lewis dot structures of NH3. Label the most electronegative atom with a delta negative (δ-). and the least electronegative atom with a delta positive (δ+). Using a dashed line, indicate where one hydrogen bonding might take place.
10. Arrange the following elements in order of increasing electronegativity. (Least electronegative to most electronegative). F, I, Br.
11. Explain why water has a higher boiling point than H2S, dihydrogen monosulfide.
12. Indicate whether the following compounds can participate in hydrogen bonding. Write yes or no and why:
13. NF3
14. CH3OH
15. CH2CH2OH
16. NH3
17. HF

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objective: SWBAT define the mole and calculate the molar mass of an element and compound.** **SWBAT calculate percentage composition.** |

Class Notes:

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| **The Mole**What is a mole?Avogrado’s Number1 mole of substance is equal to 6.022 x 1023 atoms. How to Calculate Molar Mass How to Calculate Percentage Composition |

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objective: SWBAT define the mole and calculate the molar mass of an element and compound.** **SWBAT calculate percentage composition.** |

Class Work:

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| Calculate the molar mass for the following compounds.1. Ba(NO3)2
2. HF
3. H2S
4. Na3PO4
5. K2SO4

Calculate the percentage composition of the following compounds.1. Cu2S
2. HNO3
3. Ca3(PO4)2
4. H2S
5. CO2
6. How many phosphorus atoms are there in one mole of potassium phosphate?

 2. How many carbon atoms are there in one mole of magnesium bicarbonate? |

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objective: SWBAT determine the empirical formula of a compound using percentage composition.** |

Class Notes:

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| **Empirical Formula**What is an empirical formula?How to Calculate an Empirical Formula Given Percentage Composition:1. Convert the percentage composition values to mass.
2. Determine the number of moles of each element in the compound.
3. Identify the smallest number of moles and divide that by all the other moles to find the ratios.
4. Round the ratio to the nearest whole number. This ratio is now your subscript.
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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objective: SWBAT determine the empirical formula of a compound using percentage composition.** |

Class Work: (\*\*If you need extra space, feel free to attach lined paper to this packet.)

1. A compound is found to contain 36.58% Na, 25.41% S, and 38.11% O. What is its empirical formula?
2. Find the empirical formula of a compound that contains 53.70% iron and 46.30% sulfur.
3. What is the empirical formula of a compound that contains 32.8% chromium and 67.2% chlorine?
4. What is the empirical formula of a compound that contains 67.1% Zinc and the remaining is oxygen?
5. Name the compound from question 4.
6. A compound is 24.7% Calcium, 1.2% Hydrogen, 14.8% Carbon, and 59.3% Oxygen. Write the empirical formula.

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objective: SWBAT determine the empirical formula of a compound using mass composition.** |

Class Notes:

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| **Empirical Formula Continued**How to Calculate an Empirical Formula Given Mass:Example:1. Convert given masses to moles.
2. Divide the smallest mole value by all the other mole values to find the ratios.
3. Round each ratio to the nearest whole number to get the subscripts of each element. (If you cannot round a ratio to a whole number, multiply by 2 and then round to a whole number.)
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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Objective: SWBAT determine the empirical formula of a compound using mass composition.** |

Class Work:

1. Analysis of 20.0 g of a compound containing only 4.00 g of calcium and 16.00 g of bromine. What is the empirical formula of the compound formed?
2. In an experiment, it was found that 11.775 g of Sn combined with 3.180 g of O. Write the empirical formula and name the compound that is formed.
3. Maryann has a sample of a compound which weighs 200 grams and contains only carbon,

hydrogen, oxygen and nitrogen. By analysis, he finds that it contains 97.56 grams of carbon, 4.878 g of hydrogen, 52.03 g of oxygen and 45.53 g of nitrogen. Find its empirical formula.

1. 200.00 grams of an organic compound is known to contain 83.884 grams of carbon, 10.486 grams of oxygen and the rest is nitrogen. What is the empirical formula of the compound?
2. 300 grams of an organic sample which contains only carbon, hydrogen, and oxygen is analyzed and found to contain 145.946 grams of carbon, 24.3243 grams of hydrogen and the rest is oxygen. What is the empirical formula for the compound?

Make sure Mr. Gutierrez stamps/signs this by the end of the period. You CANNOT get the stamp/signature for a day later on. It is your responsibility to remind Mr. Gutierrez. You will NOT receive a stamp if you did not follow all classroom policies or actively worked on the practice problems during class time.

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| **Followed All Classroom Policies****(Be respectful, on time, prepared and engaged…)** | **Class work Participation****(Working on packet during allotted time)** |
| /20 | Monday | /20 |
| /20 | Tuesday | /20 |
| /20 | Wednesday | /20 |
| /20 | Thursday | /20 |
| /20 | Friday | /20 |