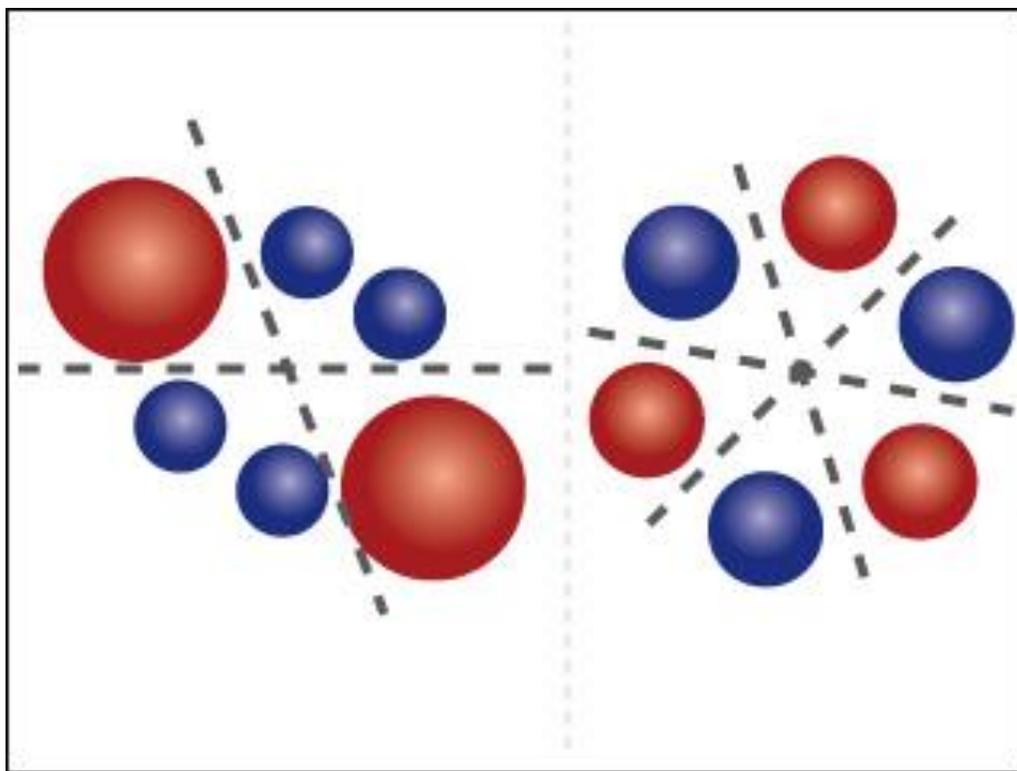# Lawrence High School's
AP Chemistry
2019 Summer Assignment

To incoming AP Chemistry Students:

To be best prepared for AP Chemistry in September, you are assigned a mandatory summer assignment. This assignment serves to review essential concepts from the foundational chemistry course.

You will submit this completed packet during the first <u>full week</u> of school. This assignment will be graded and count as the first test of the first marking period. If you are struggling with concepts/material, below are some resources for you to reference.

Required Summer Assignment for AP Chemistry 2019
Register for Google classroom
- Sign up for AP Chemistry google classroom, by using class code: "**n8hkmei**"
- Check back frequently for hints and modifications

Review assignment
- Read and familiarize yourself with Chapters 1-3 of the textbook.
- **In our Google Classroom, there will be a pdf version of the textbook to reference.**
- **The readings are also posted on LPTS.org through the Summer Assignment link.**
- **You do not need to borrow a book for the summer**.
- Complete the assignment provided.

Be prepared to take a test on the included content within the first two weeks of school.

Scoring/Grading
- The AP Chemistry Summer Assignment is worth a total of 60 points
- Show work for all calculations. Partial credit may be awarded for correct work with an incorrect answer.
- Your grade will be based on the completeness and accuracy.
- There will be an assessment included in your first marking period grade.

Resources
- chemmybear.com
- teachertube.com
- chemtutor.com
- Crash Course channel on Youtube.com
- Your notebook and other materials from the foundation Chemistry course

1. Identify the number of significant figures (sig figs) in the following:

   ▪ 738.90 meters   _____

   ▪ 0.0304 grams   _____

   ▪ 1.4×10^4 joules   _____

   ▪ 40 mL   _____

2. The density of bismuth metal is 9.8 g/cm^3. What is the mass of a sample of bismuth that displaces 65.8mL of water?

3. Calculate the following to the correct number of sig figs, include units:

   ▪ 1.27 g/5.296 cm^3 _____

   ▪ 12.2 g + 0.38 g   _____

   ▪ 2.1 m x 3.215 m   _____

   ▪ 17.6g – 2.838g + 110.77g   _____

4. Perform the necessary calculations to convert temperature:

Fahrenheit	Celsius	Kelvin
73.5 °F		
	37.0 °C	
		212.35 K

5. Determine the number of protons, neutrons, and electrons in each of the following:

   ▪ Potassium atom   _____P   _____N   _____E

   ▪ Sodium ion   _____P   _____N   _____E

   ▪ Lead-208   _____P   _____N   _____E

   ▪ Iron (II) ion   _____P   _____N   _____E

6. White gold is an alloy that typically contains 45.0% by mass gold and the remainder is platinum. If 154 grams of gold are available, how many grams of platinum are required to combine with the gold to form this alloy?

7. Explain the following atomic laws:
   - Law of Conservation of Mass

   - Law of Definite Composition

   - Law of Multiple Proportions

8. Identify the researcher by his/her contribution to science:
   - Developed the Plum-Pudding model after working with Cathode Ray Tubes

   - His oil drop experiment helped determine the mass of an electron

   - Predicted the existence of a positively-charge nucleus via Gold Foil Experiment

   - Discovered a neutral particle, later named the neutron

   - Pioneer of radiation, she worked with Henri Becquerel

9. Determine the number of molecules present in a 4.56 mol sample of methane gas (CH_4); then determine the mass in grams.

10. In an experiment, a student gently heated a hydrated copper compound to remove the water of hydration. The following data was recorded:
    1. Mass of crucible, cover, and contents before heating = 23.40 grams
    2. Mass of empty crucible and cover = 18.82 grams
    3. Mass of crucible, cover, and contents after heating to constant mass = 20.94 grams

    Calculate the percent composition by mass of water in the copper compound.

11. A hydrated compound has an analysis of 18.29% Ca, 32.37% Cl, 49.34% water. What is its formula?

12. What mass of copper is required to completely replace silver from 4.00g of silver nitrate dissolved in water by the reaction: $Cu (s) + 2AgNO_3 (aq) \rightarrow Cu(NO_3)_2 (aq) + 2 Ag (s)$

13. Write the chemical formula for the following:
   - Calcium sulfate   _____
   - Ammonium phosphate   _____
   - Potassium perchlorate   _____
   - Calcium iodide   _____
   - Aluminum carbonate   _____
   - Magnesium acetate   _____
   - Potassium cyanide   _____
   - Iron (ii) chromate   _____
   - Zinc nitrate   _____
   - Sodium oxide   _____

14. Calculate the molar mass (g/mol) of:
   - Ammonia (NH_3)

   - Baking soda ($NaHCO_3$)

   - Calcium sulfate dehydrate ($CaSO_4 \bullet 2H_2O$)

15. The molecular formula of morphine, a pain-killing narcotic, is $C_{17}H_{19}NO_3$.
   - What is its molar mass?

   - What fraction of atoms in morphine is accounted for by carbon?

   - Which element contributes least to the molar mass?

16. Complete the list of ionic compounds. (Supply the name or formula)
   - Cupric hydroxide   _____
   - Strontium sulfate   _____
   - Ammonium perchlorate   _____
   - $Ca(HCO_3)_2$ _____
   - $Fe_2(CO_3)_3$ _____
   - Sodium borate   _____
   - H_3PO_4 _____

17. Calculate the percentage by mass of oxygen in the following compounds:
   - SO_3

   - CH_3COOH

   - Ammonium nitrate

18. In nature, Strontium consists of four isotopes with masses and percent abundance of 83.9134 amu (0.50%), 85.9094 amu (9.9%), 86.9089 amu (7.0%), and 87.9056 amu (82.6%). Calculate the atomic mass of Sr.

19. Determine the empirical formula of the compound with the following composition by mass: 10.4% C, 27.8% S, 61.7% Cl

20. Washing soda is a hydrate of sodium carbonate. Its formula is $Na_2CO_3 \bullet xH_2O$. A 2.714g sample of washing soda is heated until a constant mass of 1.006g of Na_2CO_3 is reached. What is the value of x in the formula?

21. What is the molecular formula of a compound with the empirical formula NH_2Cl with a molar mass of 154.5 g/mol?

22. Write balanced chemical equations for the reaction of sodium with the following nonmetals to form ionic solids:
  ▪ Nitrogen

  ▪ Oxygen

  ▪ Sulfur

23. Write a balanced equation for each of the following:
   ▪ The reaction of magnesium oxide with iron to form iron (III) oxide and magnesium

   ▪ Solid cyanamide ($CaCN_2$) reacts with water to form calcium carbonate and ammonia gas.

   ▪ Propane (C_3H_8) burns in excess air (oxygen).

   ▪ Nitrogen gas reacts with hydrogen to form ammonia

   ▪ Sodium oxide reacts with water to form sodium hydroxide and hydrogen

   ▪ Concentrated hydrochloric acid reacts with concentrated sodium hydroxide to form sodium chloride and water.

24. Sodium hydroxide reacts with carbon dioxide as follows:
   $2NaOH\ (s) + CO_2\ (g) \rightarrow Na_2CO_3\ (s) + H_2O\ (l)$

   Which reagent is limiting when 1.85 mol of sodium hydroxide and 1.00 mol carbon dioxide are

   allowed to react? How many moles of sodium carbonate can be produced?

25. When hydrogen sulfide gas, H_2S, reacts with oxygen, sulfur dioxide gas and steam are produced.
   ▪ Write the balanced chemical equation for this reaction.
   ▪ How many liters of sulfur dioxide would be produced from 4.0L of oxygen?

26. When benzene (C_6H_6) reacts with bromine (Br_2), bromobenzene (C_6H_5Br) is obtained:
   $$C_6H_6 + Br_2 \rightarrow C_6H_5Br + HBr$$

   What is the theoretical yield of bromobenzene in this reaction when 30.0g of benzene reacts with 65.0g of bromine? If the actual yield of bromobenzene was 56.7grams, what was the percent yield?

27. Name the following molecular compounds:
   ▪ P_4O_{10} _____

   ▪ NI_3 _____

   ▪ CCl_4 _____

   ▪ SF_6 _____

   ▪ CO_2 _____

   ▪ SBr_5 _____