Clearview Regional High School District
2019 Summer Assignment Coversheet

Course:	**AP Chemistry**
Teacher(s):	**Jim Navins**
Due Date:	**Online coursework will be completed by: Friday 09/06/2019**
Purpose of Assignment:	**Students will maintain and sharpen skills established in Honors Chemistry through on-line introduction to Mastering Chemistry Program that will be utilized to meet the rigorous demands in AP Chemistry.**
Description of Assignment:	**Students will receive review packet from Mr. Navins. Students will complete review material and solve test problems. Assignments consist of tutorials and practice test questions in Units Three and Four. Each unit will consist of practice questions that have been part of our Honors Chemistry curriculum. The total amount of time dedicated to the summer work is five (5) hours.**
NJ Student Learning Standards covered:	HS-PS1-1. **Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.** Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen. HS-PS1-8. **Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.** Clarification Statement: Emphasis is on simple qualitative models, such as pictures or diagrams, and on the scale of energy released in nuclear processes relative to other kinds of transformations. HS-PS1-2. **Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.**[Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and hydrogen.

	HS-PS1-4. **Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.** Clarification Statement: Emphasis is on the idea that a chemical reaction is a system that affects the energy change. Examples of models could include molecular-level drawings and diagrams of reactions, graphs showing the relative energies of reactants and products, and representations showing energy is conserved. HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. Clarification Statement: Emphasis is on using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques.
Grading/Use of Assignment: Category/Weight for Q1:	**The summer work is graded as a classwork assignment for MP #1.** **Category: Multiple (classwork) grades for each unit** **Classwork Weight: 1.0 put of 1.0** **Test/Assessment: Multiple assessment grades designated as an (Assessment) grade with a weight of (0.5 minor assessment or major assessment 1.0)** **Following check for understanding during the month of September.**
Specific Expectations:	**Students will complete packet to the best of their ability and we will check responses collectively in class in September.**
Where to Locate Assignment:	**Assignment was handed out to each student in June. Assignment will be posted to the district website.**
Teacher Contact Information:	**Jim Navins - Navinsja@clearviewregional.edu**

Additional Help/ Resource(s):	**Textbook, e-Book, and online resources available online through Mastering Chemistry (mastering chemistry.com)** **Princeton Review for AP Chemistry**

Name: _____ **Period:** _____ **Date:** _____

AP Chemistry Summer Review Packet 2019

Section A.

Determine the empirical/molecular formula (lowest whole number ratio) of the following compounds from the given data. (5 points each)

1) 49.48% carbon, 5.19 % hydrogen, 28.85% nitrogen, and 16.48% oxygen by mass. The molecular weight is 194.19 g/mol.

2) 70.79% carbon, 8.91% hydrogen, 15.72% oxygen, and 4.59% nitrogen.

3) 36.86% nitrogen and 63.14% oxygen.

4) The empirical formula of a substance is C_2H_4NO. If its molar mass is 116.1 g/mol, what is the molecular formula of the compound?

Section B:

1) **Photosynthesis is a process that incorporates carbon dioxide and water and yields food in the form of glucose ($C_6H_{12}O_6$) for the plant with oxygen as the by-product. In a (5) five minute period a tree consumes 140 grams of water and 320 grams of carbon dioxide in this process. Determine the limiting reagent, the excess reagent and the amount remaining of the excess reagent, and the amount of glucose produced. (Show all work for each section)**

a. **Write a balanced equation.**

b. **Determine the limiting reagent and excess reagent using dimensional analysis. (Show all work!)**

c. **Determine the amount remaining of the excess reagent. (Show all work!)**

d. **Determine the amount of glucose produced. (Show all work!)**

e. **What is the percent yield if 180 grams of glucose is produced?**

Part C:
Write and balance polyatomic formulas from the given metals/cations and non-metals/ anions. Make sure all formulas are neutral.

	CO_3^{-2}	SO_4^{-2}	PO_4^{-3}	NO_3^{-}	OH^{-}
Sn^{4+}					
Cr^{3+}					
Li^{+}					
NH_4^{+1}					
Ca^{2+}					

Part D:

Predict if the following single displacement reactions will yield products. Label the new products as solid (s) neutral atoms and aqueous (aq) compounds. Balance the reaction and determine if the new aqueous (aq) compound is soluble. (5 points each)

1) $Zn^{0}_{(s)} + CuCl_{2\,(aq)} \rightarrow$

2) $Na^{0}_{(s)} + H_2O_{(aq)} \rightarrow$

3) $Zn^{0}_{(s)} + NiCl_{3\,(aq)} \rightarrow$

4) $Cu^{0}_{(s)} + H_2O_{(aq)} \rightarrow$

5) $F_2{}^{0}_{(g)} + KBr_{(aq)} \rightarrow$

6) $Mg^{0}_{(s)} + FeCl_{3\,(aq)} \rightarrow$

Part E: Double Displacement/Solubility Reactions

- **Predict if the following reactions will take place using your rules for solubility.**
- **Write the new products and show all states using (aq) for the soluble product and (s) for the insoluble product. Use (g) for gases and (l) for water in gas generation reactions.**
- **Balance the reaction.**
- **Show all the soluble cations and anions for a precipitation reaction (pull the reaction apart) and the final insoluble (solid) product.**

1) **Aqueous lead (II) nitrate $Pb(NO_3)_2$ reacts with aqueous potassium chloride KCl.**

2) **$Sr(OH)_{2\,(aq)} + (NH_4)_2S$**

3) **$CoCl_{2\,(aq)} + AgNO_{3\,(aq)}$**

4) **$Ba(CH_3COO)_{2\,(aq)} + LiOH_{\,(aq)} \rightarrow$**

5) **$Ca(OH)_{2\,(aq)} + Rb_2CrO_{4\,(aq)} \rightarrow$**

Section F:

Balance the following chemical reactions using whole number coefficients and then identify the reaction type.

1) ____ $NaBr$ + ____ $Ca(OH)_2$ → ___ $CaBr_2$ + ____ $NaOH$

Type of reaction: _____

2) ____ NH_3+ ____ H_2SO_4 → ____ $(NH_4)_2SO_4$

Type of reaction: _____

3) ____ C_7H_{17} + ____ O_2 → ____ CO_2 + ____ H_2O

Type of reaction: _____

4) ____ BF_3 + ____ Li_2SO_4 → ___ LiF + ____ $B_2(SO_4)_3$

Type of reaction: _____

5) ____ Li_3N + ____ NH_4NO_3 → ___ $LiNO_3$ + ___ $(NH_4)_3N$

Type of reaction: _____

6) ____ HBr + ___ $Al(OH)_3$ → ___ H_2O + ___ $AlBr_3$

Type of reaction: _____

7) ____ Cs + ___ H_2O → ___ H_2 + ___ $CsOH$

Type of reaction: _____

8) ____ C_2H_2 + ___ O_2 → ___ H_2O + ___ CO_2

Type of reaction: _____

9) ____ HNO_3 + ___ $Ca(OH)_2$ → ___ H_2O + ___ $Ca(NO_3)_2$

Type of reaction: _____

10) ____ Zn + ___ H_2SO_4 → ___ $ZnSO_4$ + ___ H_2

Type of reaction: _____

11) ____ $BaBr_2$ + ___ Cl_2 → ___ Br_2 + ___ $BaCl_2$

Type of reaction: _____

12) ____ H_2 + ___ S + ___ O_2 → ___ H_2SO_3

Type of reaction: _____

13) ____ Cu + ____ $AgNO_3$ →____ $Cu(NO_3)_2$ + ____ Ag

Type of reaction: _____

14) ____ Ag_2S →____ Ag + ____ S_8

Type of reaction: _____

15) ____ MgI_2 + ____ $Pb(NO_3)_2$ →____ $Mg(NO_3)_2$ + ____ PbI_2

Type of reaction: _____

16) ____ HgO →____ Hg + ____ O_2

Type of reaction: _____

17) ___ KBr + ____ $Fe_2(SO_4)_3$ →____ K_2SO_4 + ____ $FeBr_3$

Type of reaction: _____

18) ____ Mg + ____ $FeCl_3$ →____ $MgCl_2$ + ____ Fe

Type of reaction: _____

19) ____ FeS + ____ HCl →____ $FeCl_2$ + ____ H_2S

Type of reaction: _____

20) ____ H_2O_2 →____ H_2O + ____ O_2

Type of reaction: _____

Name_____

AP Chemistry Summer Review

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which group in the periodic table contains only nonmetals? 1) _____
A) 2B B) 1A C) 2A D) 8A E) 6A

2) The reaction of a metal with a nonmetal produces a(n) _____. 2) _____
A) salt B) acid C) hydroxide D) base E) oxide

3) The correct name for H_2CO_3 is _____. 3) _____
A) carbohydrate
B) carbonous acid
C) carbonic acid
D) carbohydric acid
E) hydrocarbonate

4) The most common and stable allotrope of sulfur is _____. 4) _____
A) S_4
B) S
C) S_2
D) S_8
E) Sulfur does not form allotropes.

5) Most of the elements on the periodic table are _____. 5) _____
A) nonmetals B) gases C) metalloids D) metals E) liquids

6) Elements in Group 2A are known as the _____. 6) _____
A) noble gases
B) alkali metals
C) alkaline earth metals
D) halogens
E) chalcogens

7) The correct name for N_2O_5 is _____. 7) _____
A) nitric oxide
B) dinitrogen pentoxide
C) nitrogen pentoxide
D) nitrous oxide
E) nitrogen oxide

8) The SI unit for mass is _____. 8) _____
A) troy ounce
B) pound
C) gram
D) kilogram
E) none of the above

9) Elements in Group 6A are known as the _____. 9) _____

A) halogens
B) alkali metals
C) chalcogens
D) alkaline earth metals
E) noble gases

10) In the periodic table, the rows are called _____ and the columns are called _____. 10) _____

A) rows, groups
B) octaves, groups
C) periods, groups
D) staffs, families
E) cogeners, families

11) _____ and _____ reside in the atomic nucleus. 11) _____

A) Electrons, neutrons
B) Protons, electrons
C) Protons, neutrons
D) none of the above
E) Neutrons, only neutrons

12) Elements in Group 1A are known as the _____. 12) _____

A) noble gases
B) halogens
C) alkaline earth metals
D) alkali metals
E) chalcogens

13) Lithium is a _____ and magnesium is a _____. 13) _____

A) nonmetal, metal
B) nonmetal, nonmetal
C) metalloid, metalloid
D) metal, metal
E) metal, metalloid

14) The SI unit of temperature is _____. 14) _____

A) °F B) K C) °C D) t E) T

15) The atomic number indicates _____. 15) _____

A) the number of neutrons in a nucleus
B) the total number of neutrons and protons in a nucleus
C) the number of different isotopes of an element
D) the number of atoms in 1 g of an element
E) the number of protons or electrons in a neutral atom

16) An element cannot _____. 16) _____

A) be a pure substance
B) be part of a homogeneous mixture
C) be separated into other substances by chemical means
D) interact with other elements to form compounds
E) be part of a heterogeneous mixture

17) Elements in Group 7A are known as the _____. 17) _____

A) alkali metals
B) noble gases
C) alkaline earth metals
D) halogens
E) chalcogens

18) The correct name for HNO_3 is _____. 18) _____

A) nitrogen hydroxide
B) nitrous acid
C) nitric acid
D) nitroxide acid
E) hydronitroxide acid

19) The correct name for H_2SO_4 is _____. 19) _____

A) sulfurous acid
B) sulfur hydroxide
C) hydrosulfic acid
D) sulfuric acid
E) hydrosulfuric acid

20) When a metal and a nonmetal react, the _____ tends to lose electrons and the _____ tends to gain electrons. 20) _____

A) metal, metal
B) metal, nonmetal
C) nonmetal, metal
D) nonmetal, nonmetal
E) None of the above, these elements share electrons.

21) Accuracy refers to _____. 21) _____

A) how close a measured number is to the true value
B) how close a measured number is to zero
C) how close a measured number is to the calculated value
D) how close a measured number is to other measured numbers
E) how close a measured number is to infinity

22) Sodium forms an ion with a charge of _____. 22) _____

A) 2+ B) 0 C) 2− D) 1− E) 1+

23) The correct name for Al_2O_3 is _____. 23) _____

A) dialuminum oxide
B) aluminum hydroxide
C) dialuminum trioxide
D) aluminum oxide
E) aluminum trioxide

24) Based on the octet rule, aluminum most likely forms an _____ ion. 24) _____

A) Al^{+} B) Al^{3+} C) Al^{4-} D) Al^{4+} E) Al^{-}

25) The most common sulfur ion has a charge of _____. 25) _____

A) 1–
B) 4+
C) 6+
D) 2–
E) Sulfur does not form ions.

26) The correct name for K_2S is _____. 26) _____

A) potassium sulfide
B) potassium disulfide
C) potassium sulfate
D) dipotassium sulfate
E) potassium bisulfide

27) The correct name for $HClO_3$ is _____. 27) _____

A) chlorous acid
B) perchloric acid
C) hydrochlorous acid
D) hydrochloric acid
E) chloric acid

28) The empirical formula of a compound with molecules containing 12 carbon atoms, 14 hydrogen atoms, and 6 oxygen atoms is _____. 28) _____

A) $C_{12}H_{14}O_6$
B) C_2H_4O
C) CHO
D) CH_2O
E) $C_6H_7O_3$

29) Homogeneous mixtures are also known as _____. 29) _____

A) solutions
B) solids
C) substances
D) elements
E) compounds

30) Elements in Group 8A are known as the _____. 30) _____

A) alkaline earth metals
B) halogens
C) noble gases
D) chalcogens
E) alkali metals

31) The correct name for HClO is _____. 31) _____

A) perchloric acid
B) hypochlorous acid
C) chloric acid
D) chlorous acid
E) hydrochloric acid

32) Precision refers to _____. 32) _____

A) how close a measured number is to the calculated value
B) how close a measured number is to the true value
C) how close a measured number is to other measured numbers
D) how close a measured number is to infinity
E) how close a measured number is to zero

33) The correct name for SO is _____. 33) _____

A) sulfoxide
B) sulfate
C) sulfur monoxide
D) sulfite
E) sulfur oxide

34) What are the spectator ions in the reaction between KCl (aq) and $AgNO_3$ (aq)? 34) _____

A) K^+ and Ag^+
B) Ag^+ and Cl^-
C) K^+ only
D) Ag^+ and NO_3^-
E) K^+ and NO_3^-

35) The correct name for HIO_2 is _____. 35) _____

A) hydriodic acid
B) periodic acid
C) periodous acid
D) hypoiodic acid
E) iodous acid

36) The correct name for $HClO_2$ is _____. 36) _____

A) chloric acid
B) hypochlorous acid
C) perchloric acid
D) chlorous acid
E) hypychloric acid

37) Elements in the modern version of the periodic table are arranged in order of increasing _____. 37) _____

A) average atomic mass
B) atomic number
C) atomic mass
D) number of isotopes
E) oxidation number

38) The _____ have the most negative electron affinities. 38) _____

A) chalcogens
B) alkali metals
C) alkaline earth metals
D) halogens
E) transition metals

39) Electronegativity _____ from left to right within a period and _____ from top to bottom within a group. 39) _____

A) increases, stays the same
B) decreases, increases
C) increases, decreases
D) stays the same, increases
E) increases, increases

40) The halogens, alkali metals, and alkaline earth metals have _____ valence electrons, respectively. 40) _____

A) 1, 5, and 7 B) 8, 2, and 3 C) 2, 7, and 4 D) 7, 1, and 2 E) 7, 4, and 6

41) In general, as you go across a period in the periodic table from left to right: 41) _____

(1) the atomic radius _____;
(2) the electron affinity becomes _____ negative; and
(3) the first ionization energy _____.

A) increases, increasingly, decreases
B) decreases, decreasingly, increases
C) increases, increasingly, increases
D) decreases, increasingly, decreases
E) decreases, increasingly, increases

42) The only noble gas without eight valence electrons is _____. 42) _____

A) He
B) Kr
C) Ne
D) Ar
E) All noble gases have eight valence electrons.

43) A nonpolar bond will form between two _____ atoms of _____ electronegativity. 43) _____

A) identical, equal
B) different, different
C) similar, different
D) identical, different
E) different, opposite