HONORS CHEMISTRY
2ND SEMESTER EXAM REVIEW
MAY 2019

THE FOLLOWING IS A LIST OF OBJECTIVES THAT YOU SHOULD HAVE ACCOMPLISHED THIS SEMESTER IN CHEMISTRY. YOU SHOULD ANSWER EACH ONE BEFORE YOU TAKE YOUR EXAM.

BONUS: YOU MAY RECEIVE 0.2 POINT BONUS ON YOUR EXAM FOR EACH OBJECTIVE THAT IS ANSWERED COMPLETELY AND CORRECTLY AND TURNED IN BY THE DAY OF YOUR EXAM. YOU MAY ANSWER A MAXIMUM OF 50 OBJECTIVES FOR EXTRA CREDIT.

USE AT LEAST 1/2 OF A PAGE TO ANSWER EACH OBJECTIVE (leave that much space, even if it does not need that much room). BEGIN THE NEXT QUESTION EITHER HALF WAY DOWN THE PAGE, OR AT THE BEGINNING OF THE NEXT PAGE. DO NOT ANSWER MORE THAN TWO OBJECTIVES PER PAGE. YOU ARE ENCOURAGED TO WRITE ON THE BACK. PUT YOUR NAME AND CLASS PERIOD ON EACH PAGE.

DO NOT COPY ANYONE ELSE'S WORK **(NO ONE'S - NOT EVEN YOUR LAB PARTNER'S)**, WRITTEN OR ORAL, FOR ANY OBJECTIVE. If you have done so, or if you know of anyone who has done so, you are obligated to tell me immediately. Your honor is worth more than ten points extra credit!

1. *Know the names, symbols, and oxidation numbers of the common elements. (Know for the exam, but do not include in the exam review packet.)*

2. Determine the formula and name of an ionic compound between any two elements or ions. (3 examples with monatomic ions, 3 examples with polyatomic ions)

3. Determine the formula and name of an ionic compound between two given elements or ions when the when the first element can have more than one oxidation number. (3 examples total)

4. Using prefixes name a binary molecular compound from its formula and write the formula of a binary molecular compound given its name. (4 examples)

5. Memorize the names and symbols of common polyatomic ions. (List all)

6. Memorize the chemical names and formulas of common laboratory acids and also chemical names and formulas of common substances. (List all)

7. Give examples of the uses (2) of each of the types of electromagnetic radiation, and be able to list the spectrum in order by frequency, wavelength, or energy the electromagnetic spectrum and the visible spectrum. Know the wavelength range of the visible spectrum.

8. Work problems with frequency, wavelength and speed of electromagnetic radiation. Give one example.

9. Be able to illustrate, describe, and give examples of the photoelectric effect.

10. Be able to illustrate and describe spectroscopy and the role it plays in identifying elements.

11. Work problems with the frequency and energy of electromagnetic radiation using Planck's constant: $E = h\nu$. Give one example.

12. Describe the modern periodic table, including groups, periods, types of elements, and blocks. *(Make a rough sketch with labels.)*

13. Describe the relationship between electrons in sub-levels and the length of each period of the periodic table.

14. Compare and the contrast general properties of the alkali metals, the alkaline earth metals, and the transition metals, and describe their location in the Periodic Table. Give one example of each.

15. Compare and the contrast general properties of the halogens and the noble gases and describe their location in the Periodic Table. Give one example of each.

16. *Know the uses and sources of the common elements on the periodic table. (Know for the exam, but do not include in the exam review packet.)*

17. Use electron configuration to determine the block, group, period and type of an element. Give one example from each block.

18. Define valence electrons and make a table to list how many valence electrons are present in atoms of each s and p block group and the charge of the ion that will be formed from the elements in that group.

19. Write noble gas notation. Give four examples, one from each block.

20. Describe the modern periodic table, including groups, periods, types of elements, and blocks. (Make a rough sketch with labels.)

21. State the octet rule and use it to describe ionic and covalent bonding.

22. Classify bonds according to electronegativity differences. (4 examples)

23. Write the Lewis structure for molecules and polyatomic ions containing both single and multiple bonds and use the VSEPR theory to name the shape of each. (2 examples of molecules and 2 examples of polyatomic ions)

24. Draw ionic bonding and write the formula unit for the compound formed (3 examples).

25. List and compare the distinctive properties of ionic and molecular compounds. Use bond energy and lattice energy to explain the differences

26. Describe the electron-sea model of metallic bonding and explain why metals are malleable and ductile, but ionic compounds are not.

27. Describe dipole-dipole forces, hydrogen bonding, an induced dipole and London dispersion forces.

28. Use van der Waals forces to explain why molecules exist either as solids, liquids or gases at room temp.

29. Use bond type to describe solubility – why some substances are soluble and some substances are not.

30. Describe five symbols that are used in chemical equations and use them in a balanced equation (they may be in the same or different equations).

31. Define and give general equations for synthesis, decomposition, single replacement, and double replacement reactions.

32. List and give examples of each of the five types of synthesis reactions.

33. List and give examples of each of the five types of decomposition reactions.

34. List and give examples of the five types of single replacement reactions.

35. Give examples of the three double replacement reaction and three combustion reactions.

36. Use the activity series to predict whether or not single replacement reaction will occur. Write two (2) balanced equations for reactions that will occur and two (2) examples of reactions that will not occur.

37. Use the activity series to predict whether or not synthesis and decomposition reactions will occur and what the product will be. Write two (2) balanced equations for reactions that will occur and two (2) examples of reactions that will not occur.

38. Given reactants in a chemical reaction, work mole-mole stoichiometry problems *(work two examples – make up your own equation or use one from the book)*.

39. Given reactants in a chemical reaction, work mole-mass and mass mole stoichiometry problems (one example of each - *make up your own equation or use one from the book*).

40. Given reactants in a chemical reaction, work mass-mass stoichiometry problems (two examples - *make up your own equation or use one from the book*).

41. Given the moles of two reactants in a chemical reaction, determine which of the reactants is the limiting reactant and calculate the mass of a product (one example - *make up your own equation or use one from the book*).

42. Given the masses of two reactants in a chemical reaction, determine which of the reactants is the limiting reactant and calculate the mass of a product (one example - *make up your own equation or use one from the book*).

43. Define theoretical yield, actual yield, and percent yield and explain how to calculate percent yield.

44. Given the mass of a reactant in a chemical reaction and the mass of a product produced in the experiment, calculate the percent yield of the reaction (one example - *make up your own equation or use one from the book*).

45. Define STP. Convert measurements from Celsius to Kelvin, atm to kPa, mm Hg to atm, and mm Hg to kPa (one example of each).

46. Can air crush a can? Explain how.

47. Define Dalton's law and use it in a problem. (One example)

48. State Graham's law of Diffusion/Effusion and use it to solve a problem OR explain an application of it to everyday life. (One example)

49. State Boyle's law and use it in a problem OR explain an application of it to everyday life. (One example). (One example)

50. State Charles' law and use it in a problem OR explain an application of it to everyday life. (One example). (One example)

51. State Gay-Lussac's law and use it in a problem OR explain an application of it to everyday life. (One example). (One example)

52. State the combined gas law and use it in a problem OR explain an application of it to everyday life. (One example). (One example)

53. Define Henry's law and use it to explain "the bends" and explain how this condition could endanger the life of a scuba diver.

54. List at least five general properties of acids and five general properties of bases.

55. Use the pH scale to determine if substances are acids or bases. For an example, arrange the following substances in order of increasing alkalinity. Write the name of the substance and include the pH. You may need to look up some of these on the Internet.

a) eggs	d) window cleaner	g) milk
b) apples	e) tomatoes	h) sea water
c) lemons	f) urine	i) bananas

56. Why do you take Tums or Maalox when you have indigestion? In your explanation, use a balanced chemical equation to illustrate your answer.

57. Describe how an acid-base indicator works and give three examples of indicators and their colors in each.

58. Find the pH of a solution given $[H_3O^+]$ or $[OH^-]$. Use the 6 examples below:

a) 1.0×10^{-2} M HCl pH = _____
b) 1.0×10^{-1} M H_2SO_4 pH = _____
c) 1.0×10^{-3} M HNO_3 pH = _____
d) 1.0×10^{-2} M NaOH pOH = _____ so pH = _____
e) 1.0×10^{-3} M KOH pOH = _____ so pH = _____
f) 1.0×10^{-4} M LiOH pOH = _____ so pH = _____