Final Exam Review Questions
You will be given a Periodic Table, Activity Series, and a Common Ions Chart
CP CHEMISTRY

Part A True-False

State whether each statement is true or false. If false, correct it so that it is a true statement.

1. Complete combustion has occurred when all the carbon in the product is in the form of carbon dioxide.

2. A single reactant is the identifying characteristic of a decomposition reaction.

3. The only way to determine the products of a reaction is to perform the reaction.

4. All chemical reactions can be classified as one of four general types.

5. With solutions of strong acids and strong bases, the word strong refers to concentration.

6. A 12 M solution of an acid that is able to ionize completely in solution would be termed concentrated and weak

7. Bitter taste is a property of an acid.

8. Only acids react with metal to form H_2 gas.

9. Only acids cause indicators to change color

10. Only bases are strong electrolytes

11. A solution which has $[H^+]$ of 1.0×10^{-7} M is strongly acidic.

12. A solution that turns red litmus blue is strongly basic.

13. The presence of a catalyst is the only factor that affects the rate of a chemical reaction.

14. $[H^+] = 2.0 \times 10^{-7}$M is an acidic solution

15. $[OH^-] = 1.0 \times 10^{-8}$M is a neutral solution.

16. $Mg(OH)_2$ is an Arrhenius base.

17. NH_3 is an Arrhenius base

18. H_2CO_3 is triprotic

19. In the reaction, $HCl + H_2O\ (aq) \rightleftharpoons Cl^-\ (aq) + H_3O^+\ (aq)$, H_2O is acting as a Bronsted-Lowry acid.

20. $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$ is a Brønsted-Lowry acid-base reaction.

21. Indicators are weak acids or bases that undergo dissociation in a known pH range.

22. Indicators can be used to determine the pH of a given solution.

23. Indicators exhibit different colors across the range of pH values for which they are used.

Part B Problem Solving

Solve each problem below, showing all work when appropriate.

Classify each reaction in questions #1 – 8 as one of the following: Single replacement, Double replacement, Composition (synthesis), Decomposition, Neutralization, or, Combustion.

1. $HgO \rightarrow Hg + O_2$
2. $S_8 + O_2 \rightarrow SO_3$
3. $4\ Fe + 3\ O_2 \rightarrow 2\ Fe_2O_3$
4. $CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$
5. $Ca(OH)_2 + 2\ HCl \rightarrow CaCl_2 + 2\ H_2O$
6. $Al(OH)_3 + H_2SO_4 \rightarrow Al_2(SO_4)_3 + H_2O$
7. $Fe_2(SO_4)_3 + KOH \rightarrow K_2SO_4 + Fe(OH)_3$
8. $C_2H_5OH + O_2 \rightarrow HC_2H_3O_2 + H_2O$
9. Write a balanced reaction for Hydrocyanic acid reacting with barium hydroxide
10. How many molecules are contained in 1.25 moles of Au?
11. What is the gram formula mass of $Fe(OH)_3$?
12. Find the mass, in grams, of 5.20 moles of H_3PO_4.
13. What is the volume, in liters, of 6.5 mol of carbon monoxide?
14. The chemical formula for glucose is $C_6H_{12}O_6$. What is the mass of 0.430 mol of this sugar?
15. How many atoms are there in 3.24 grams of Cu_2CrO_4?
16. What is the volume, in liters, of 1.87×10^{22} molecules of Br_2?
17. Calculate the percent composition of chlorine in $AlCl_3$.
18. Calculate the mass of carbon in 145.0 grams of methane, CH_4.

19. Calculate the empirical formula of a compound that is 3.05% carbon, 0.26% hydrogen, and 96.69% iodine.

20. Determine the molecular formula of a compound that is composed of 70% carbon, 3% hydrogen, and 27% nitrogen and its gram formula mass = 206g.

21. Write a skeleton equation for the reaction in which aqueous sodium chloride reacts with aqueous silver nitrate to produce aqueous sodium nitrate and solid silver chloride. Remember to include the states and to write the correct formulas for each compound. You do not have to balance this equation.

Balance each equation in #22-25.

22. $Zn + HCl \text{ ---> } ZnCl_2 + H_2$

23. $SiCl_4 + H_2O \text{ ---> } H_4SiO_4 + HCl$

24. $Na + H_2O \text{ ---> } NaOH + H_2$

25. $H_3PO_4 \text{ ---> } H_4P_2O_7 + H_2O$

For questions #26 – 31, predict the end products and write a correctly balanced equation using the correct formulas.

26. sodium metal and chlorine

27. calcium phosphate and sulfuric acid

28. phosphoric acid plus sodium hydroxide.

29. propane (C_8H_5) burns in the presence of oxygen

30. zinc and copper II sulfate

31. iron (II) chloride decomposes

32. Identify the spectator ions and write a balanced net ionic equation for $LiOH\ (aq) + H_2SO_4\ (aq) \rightarrow Li_2SO_4\ (aq) + H_2O\ (l)$

33. A sample of gas occupies a volume of 71.0 mL at a pressure of 0.50 atm and a temperature of 0.0°C. What will its pressure be (in mmHg) at a volume of 80.2 mL and a temperature of 50.0°C?

34. What is the temperature of the gas inside a 250 mL balloon filled with 0.050 g H_2 gas? The pressure of the balloon is 110 kPa.

35. In the given unbalanced reaction, how many moles of water are produced when 2.5 mole of Na_2CO_3 are formed in the reaction? $NaHCO_3 \text{ ---> } Na_2CO_3 + CO_2 + H_2O$

36. How many moles of carbon dioxide are produced from 67.0 grams of $Fe_2(Cr_2O_4)_3$ according to this unbalanced equation? $Fe_2(Cr_2O_4)_3 \text{ ---> } FeC_2O_4 + CO_2$

37. How many grams of H_2 are needed to react with an excess of Au_2S_3 to produce 513 grams of Au? The unbalanced equation for the reaction is: $Au_2S_3 + H_2 \text{ ---> } Au + H_2S$

38. How many grams of Zn are needed to produce 7.00 L of H_2 according to the unbalanced reaction?

$Zn + NaOH + H_2O \text{---> } Na_2Zn(OH)_4 + H_2$

39. According to the following unbalanced equation
$Hg(OH)_2 + H_3PO_4 \text{ ---> } Hg_3(PO_4)_2 + H_2O$,
how many molecules of water will be produced from 35.3 grams of Mercury (II) hydroxide?

40. 6.0 grams of Aluminum burns in 30 L of bromine gas, producing aluminum bromide according to the following unbalanced equation.

$Al_{(s)} + Br_{2\ (l)} \rightarrow AlBr_{3\ (s)}$

a. What is the limiting reagent?

b. How much $AlBr_3$ should be produced?

c. What chemical is in excess and by how much?

d. If the experiment only produced 50.3 grams of aluminum bromide, what is the percent yield for this experiment?

Given each of the following concentrations, find the pH

41. $[H^+] = 1.0 \times 10^{-3}M$

42. $[H^+] = 5.4 \times 10^{-12}M$

43. $[OH^-] = 1.0 \times 10^{-10}M$

44. $[OH^-] = 7.9 \times 10^{-1}M$

Given the following pH or pOH, find the [H+] concentration.

45. pH = 13

46. pH = 2.7

47. pOH = 2

48. pOH = 7.4

Write the names or formulas of the following acids or bases.

49. oxalic acid

50. lead (II) hydroxide

51. H_2CrO_4

52. $Sr(OH)_2$

53. H_2CO_3

54. Hydrofluoric acid

Final Exam Review – Part II

Identify each of the following types of matter using the choices below. Choose one from the left group of choices AND one from the right group of choices.

*(A) Homogeneous or (B) Heterogeneous **AND** (1) Element, (2) Compound, or (3) Mixture*

1. Oxygen gas _____ _____
2. Carbon Dioxide _____ _____
3. Salt _____ _____
4. Gold _____ _____
5. Salad dressing _____ _____
6. Iron _____ _____
7. Iron (II) Chloride _____ _____

8. A team of students determined the volume of a 26-g piece of wood to be 50 cm^3. A handbook of chemistry reported a density of 0.513 g/cm^3 for the same type of wood. What is the percent error of the students' values? *Show all work, including equations used and units in all steps.*

Name three physical or chemical properties that could be used to distinguish between these substances:

9. Water and salt water _____ _____ _____
10. Tin and copper _____ _____ _____
11. Fluorine and neon gases _____ _____ _____

Classify each of the following as a chemical change (C) or a physical change (P).

12. Baking bread _____
13. Evaporating water _____
14. Cutting hair _____
15. Beating eggs _____
16. Heating iron _____
17. Dissolving hot chocolate in water _____
18. How many protons, electrons and neutrons are in Carbon-14? _____ _____ _____

19. How many protons does an atom of magnesium have? _____

20. In which group in magnesium found? _____

21. What is the name of magnesium's chemical family? _____

22. How many valence electrons does magnesium have? _____

23. Is magnesium a metal, a nonmetal, or a metalloid? _____

24. How does its atomic radius compare to Calcium's? _____

25. How does its electronegativity compare to sodium's? _____

26. What ion is magnesium most likely to form in compounds? _____

27. What is magnesium's noble gas configuration? _____

28. What would be the electron configuration (not noble gas way!) for an atom of silver?

_____

Write the names of the compounds listed in numbers 29-32.

29. Na_2O _____

30. SBr_2 _____

31. $Fe_2(C_4H_4O_6)_3$ _____

32. HCl _____

Write the formulas of the compounds listed in numbers 33-37.

33. Copper (I) Phosphate _____

34. Tetracarbon dichloride _____

35. Lithium Oxide _____

36. Diphosphorus pentoxide _____

37. Phosphoric acid _____