AR Chemistry: Final Exam Review **Name**_____

Semester 2, Second Exam, Part A (Sections 3 and most of 4)

Gas Laws

1. What is the definition for "Pressure"?
2. What are the values for Standard Pressure?
3. What are the values for Standard Temperature?
4. One mole of any gas at STP has a volume of ???
5. What is the shape of the Pressure / Volume curve for a gas at constant temperature?
6. What is the shape of the Volume / Temperature curve for a gas at a constant pressure?
7. What is the shape of the Pressure / Temperature curve for a gas as a constant volume?
8. What temperature scale uses the coldest possible temperature in the Universe as 0?
9. What number do you add to Celsius to turn it to Kelvin?
10. You have 37.5 Liters of Hydrogen gas at 1.20 atm pressure and a temperature of 20.0 C. How many moles of hydrogen gas do you have?

Solutions

11. What is the term for the material that is dissolved into a solution?
12. What is the term for the material that "does the dissolving" in a solution?
13. How do most ionic compounds dissolve into water?
14. How do most covalent compounds dissolve into water?
15. What 3 things at the beginning of a formula tell you that the material breaks apart in water?
16. How many particles will "swim away" when the following compounds are dissolved in water?
    a. HCl b. $CaCl_2$ c. CH_4 d. NH_4OH e. SO_3 f. $Ca(NO_3)_2$
17. What is the molarity of a solution that has 4.5 moles dissolved into 1.5 Liters of solution?
18. How many moles are in 4.00 Liters of a 2.00 M solution?
19. How many Liters of a 3.0 M solution are needed to deliver 12.0 moles of chemical?

Thermodynamics (Heat)

20. What is the term for a process that releases heat into the environment?
21. What is the term for a process that absorbs heat into the environment?
22. What is the sign (positive or negative) for the ΔH of an exothermic process?
23. What is the sign (positive or negative) for the ΔH of an endothermic process?
24. Identify the following processes as either exothermic or endothermic.
    a. decomposition b. combustion c. warming d. freezing e. boiling
25. What are the values for Ea and ΔH for the following reactions?
    a. A reaction starts at +50, rises to +100, and ends up at +70?
    b. A reaction starts at +100, rises to +120, and ends up at +80?
26. What is the Heat of Fusion and what is the H_{fusion} value for water?
27. What is the Heat of Vaporization and what is the $H_{vaporization}$ value for water?
28. What is "specific heat" and what is the value for water?
29. How much energy (calories) does it take to heat 250 grams of water from 20 C to 40 C?
30. How much energy (calories) does it take to melt 30 grams of water at 0 ^{o}C?
31. How much energy is released when 20 grams of steam condenses at 100 ^{o}C?

Acids and Bases

32. What ion is found in excess in acidic solutions?
33. What ion is found in excess in basic solutions?

34. Identify the following solutions as being either acidic (acids) or basic (bases)?
    a. pH = 3
    b. turns litmus paper red
    c. tastes bitter
    d. pH = 9
    e. tastes sour
    f. turns litmus paper blue
    g. reacts with Mg^{+2} ions to form an insoluble precipitate
    h. reacts with metals to form H_2 gas
35. Complete the following neutralization equation: $H^+Cl^- + Na^+OH^- \rightarrow H_2O +$ _____ + _____
36. What is the value for the Keq equation for the ionization of water (Kw)?
37. What are the equations for pH and pOH?
38. You have $[H^{+1}] = 10^{-4}]$
    a. What is the $[OH^{-1}]$?
    b. What is the pH?
    c. Is this solution an acid, base, or neutral
39. The pH of a solution changes from a 6 to a 3. What is the amount of change in $[H^{+1}]$ and is the solution becoming more or less acidic?
40. You neutralize 45 mL of HCl with 30 mL of 0.10 NaOH. What was the concentration of the HCl?

Reaction Rates

41. What are the 4 things that we talked about that can be changed to increase the rate of reaction?
42. You double the concentration of reactant A and triple the concentration of reactant B. What happens to the rate of reaction? (quantify, eg. 10 times slower)?
43. You smash a solid reactant until each particle is 30 times smaller. What happens to the rate of reaction Quantify, eg. 10 times slower)?
44. What is the 10 ^oC rule?
45. What is the term for the amount of energy required for a molecule to chemically react?
46. What is the term for the intermediate species between the reactants and the products?
47. What two things are required for #46 to form?
48. A pressure cooker changes the temperature of the boiling water from 100 C to 120 C. What happens to the rate of cooking? (quantify, eg. 10 times slower)?
49. What does a catalyst change to increase the rate of reaction?
50. You add heat to a solution that is undergoing a chemical reaction:
    a. Which way, if at all, does the Poisson Distribution shift (the whale diagram)?
    b. Which way, if at all, does the Temperature Line shift?
    c. Which way, if at all, does the Activation Energy line (Ea) shift?
51. What is the definition for any “rate”?
52. What units do we use in chemistry for rate of reaction?