NAME_____

1. (4). What is the formula of the sulfide of lithium?

2. (4). How many neutrons are present in the nucleus of chlorine-35?

3. (5). What is the pH of 0.0010 M NaOH?

4. (5). Hydrogen chloride, a gas, dissolves in water with the evolution of a considerable amount of heat. Write a chemical equation that explains this observation.

5. (5). Provide the missing product in the following nuclear reaction:

   $_{94}Pu^{238} \rightarrow {}_{2}He^{4} + ?$

6. (10). Sodium amide, $NaNH_2$, reacts with water in a Brønsted acid-base reaction as follows:

   $$NaNH_2(s) + H_2O(l) \rightarrow NH_3(aq) + NaOH(aq)$$

   a. Write the net ionic equation for this reaction.

   b. Which is the stronger base, ____sodium amide or ____sodium hydroxide?

7. (4). What is the oxidation number of chlorine in NaOCl?

8. (5). The half-life of C-14 is about 6000 years. After 18,000 years, what percentage of the original amount of the isotope would remain?

9. (4). Although helium is a gas under normal conditions, it becomes a liquid at about 4 K. The principal force of attraction holding atoms together in its liquid phase is:

    a. ____Ion-ion
    b. ____Dipole-dipole
    c. ____London dispersion (induced dipole-induced dipole)
    d. ____Hydrogen bonding

10. (4). One of the following combinations would likely form a homogeneous mixture. Check it.

    a. ____gasoline and water
    b. ____glucose and water
    c. ____olive oil and vinegar
    d. ____sodium chloride and hexane (C_6H_{14})

11. (5). Balance the following equation:

    C_4H_6 + O_2 → CO_2 + H_2O

12. (5). Identify the element that has the same electronic configuration as Se^{2-}.

13. (5). Check the one reaction below that does not go to completion (99%). (Note: equations are not necessarily balanced):

a. ____$Na_2CO_3(aq)$ + $HCl(aq)$ → $NaCl(aq)$ + $CO_2(g)$ + $H_2O(l)$
b. ____$Na_2SO_4(aq)$ + $KNO_3(aq)$ → $NaNO_3(aq)$ + $K_2SO_4(aq)$
c. ____$NaCl(aq)$ + $AgNO_3(aq)$ → $AgCl(s)$ + $NaNO_3(aq)$
d. ____$NaOAc(aq)$ + $HCl(aq)$ → $NaCl(aq)$ + $HOAc(aq)$

14. (5). Consider the following balanced equation:

    $2\ Al(s)$ + $6HCl(aq)$ → $2\ AlCl_3(aq)$ + $3\ H_2(g)$

    If 54.0 g of aluminum reacts with an excess of HCl, what volume of hydrogen will be produced at STP?

NAME_____

15. (5). Which is the limiting reagent in the reaction of 50.0 g $Ca(OH)_2$ with 50.0 g CO_2:
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

16. (12). Give a specific example of each of the following:

a. The proper name of manganese dioxide, MnO_2

b. An isotope of carbon-14

c. The metal whose electronic configuration is Ar)$4s^2\ 3d^5$

d. The conjugate acid of HPO_4^{2-}

17. (6). Boron trifluoride (BF_3) does not obey the octet rule and has dipole moment of zero. Draw the Lewis structure showing all valence electrons, predict its geometric shape and specify the F-B-F bond angle. (B is the central atom).

18. (5). One liter of steam ($H_2O(g)$) at 120 deg C and 1.00 atm pressure is heated to 240 deg C at constant volume. What is the final pressure of the steam?

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19. (4). In osmosis, the flow of water molecules across a semipermeable membrane is from

____ more concentrated solution to less concentrated;

____less concentrated solution to more concentrated.

20. (5). Write the equilibrium constant expression, K, for the following reaction:

$N_2(g) + 3H_2(g) = 2NH_3(g)$

21. (5). What is the pH of an acetic acid (0.100 M) – sodium acetate (0.200 M) buffer solution? The pKa of acetic acid is 4.75.

22. (5). Amanda von Weisenheimer obtained the following data using the ideal gas law: weight of unknown gas = 0.121 g; number of moles of unknown gas = 0.00168 moles. What is the molecular weight of Amanda's unknown gas?

23. (6). Consider the bond dissociation reaction, $H_2(g) \rightarrow 2\ H(g)$.
    a. Is the reaction ____exothermic or ____endothermic?
    b. Is ΔS ____positive or ____negative?

24. (5). What is the molarity of a solution made up by dissolving 24.0 g Na_2SO_4 in water and diluting to a final volume of 500 mL?

NAME_____

Useful information;

Universal gas law constant, R: 62.4 L-mmHg/mol-K; 0.0821 L-atm/mol-K.

pH + pOH = 14; pKa + pKb = 14; pKw = 14.

Henderson-Hasselbalch eqn: pH = pKa + log{[base]/[acid]}

Solubility rules: All Group IA metals and NH4+ salts are soluble; all halide salts are soluble except for silver and lead halides; all nitrates and acetates are soluble; all sulfates are soluble except for barium and lead sulfates; most others including hydroxides and sulfides are insoluble if not falling into one of the groups referenced above.

SCORING

1. (4)____
2. (4)____
3. (5)____
4. (5)____
5. (5)____
6. (10)____
7. (4)____
8. (5)____
9. (4)____
10. (4)____
11. (5)____
12. (5)____
13. (5)____
14. (5)____
15. (5)____
16. (12)____
17. (6)____
18. (5)____
19. (4)____
20. (5)____
21. (5)____
22. (5)____
23. (6)____
24. (5)____

TOTAL POINTS _____

CLASS MEDIAN _____

YOUR ADJUSTED SCORE (%)_____

YOUR FINAL GRADE ____