SCH 4U Review Questions-ANSWERS

1. The heat of formation at std conditions $\Delta H°_f$ for each **element** has a value of **_zero_**

2. When ice melts, the product is more **disordered** therefore ΔS is **_positive__**

3. What are the 5 factors that affect the rate of a rx **temp, conc, cat, surf area, nature of sub**

4. A rx with the rate expression, rate = k $[Cr^{3+}]^2[H^+]^1$ is **_second__** order Cr^{3+} & **_third_** order overall

5. The temperature of a substance is related to the average **_kinetic_** energy of that chemical substance.

6. For a 1st order reaction , the rate constant K has units of **___s^{-1}____**

7. If a rx is 2nd order for reactant B and the[B] is quadroupled what will happen to the rate **_rate x 16__**

8. If a rx is 1/2 order for catalyst C and the[C] is quadroupled what will happen to the rate **__rate x 2__**

9. $CO + 1/2\ O_2$ ' CO_2 Write the Ke expression for this gaseous rx **__Ke = $[CO_2]/[CO]*[O_2]^{1/2}$_**

11. Consider H_2 (g) + X_2 (g) ' 2HX (g). At a certain temp the following concentrations were measured

   $[H_2\ (g)]$ = 0.50 M, $[X_2\ (g)]$ = 1.0 M & $[HX(g)]$ = 0.30 M. What is Ke for this reaction at this temperature **_Ke = 0.18_**

11. Consider H_2 (g) + I_2 (g) ' 2HI (g).. At 695 K the **Ke = 54.6**. If the $[H_2\ (g)]$ = $[I_2\ (g)]$ = 1.5 x 10^{-3} M calculate the concentration of

   HI (g) at this temperature. **___[HI] = 1.1 x 10^{-2}____**

12. Calculate the Ksp value foe magnesium fluoride if its solubility is 1.67 x 10^{-3} g/100 mL at 18° C **__7.8 x 10^{-11}_**

13. 10.0 g of sodium hydroxide are dissolved in 250 mL of water, what is the [NaOH] ? **_____1.0 M_____**

14. What is the Ka value for chlorous acid if the acid is 0.68 M and 13.8 % ionized at 25° C **_____1.5 x 10^{-2}__**

   0.138 x 0.68 M = **0.09384** so **$[H^+]$ = $[ClO_2^-]$ = 0.094** & **$[HClO_2]$ = 0.68-0.094 =0.586**

   Ka = 0.094 * 0.094 / 0.586 = 1.5 x 10^{-2}

15. The Kw for water = **_$[H^+][OH^-]$_** & has a value of **_1.0 x 10^{-14}_**– ; pH + pOH = **_14_**

16. a) What is the pH of a sol'n which has a hydrogen ion concentration = 4.0 x 10^{-8} **__7.4_**

   b) What is the pH of 100 mL of a 0.01 M H_2SO_4 solution **_1.7__**

   c) What is the $[H^+]$ in a solution with pH = 4.2 **_____6.3 x 10^{-5}_**

17. Calculate the pH of a sol'n containing 7.0 x 10^{-2} M OH^- **_____12.8____**

18. Calculate the pOH of a sol'n containing 2.50 x 10^{-6} M H^+ **___8.4___**

19. Complete this eq'n HBr + HCO_3^- ' **_H_2CO_3_** + **__Br^-_**. The L-B acids are **__HBr__** & **__H_2CO_3_**

20. What does the term **amphoteric** mean: **__can behave as either an acid or base_**

21. Would Na_2HPO_4 be acidic or basic? **_basic_** why? **_HPO_4 is the conjugate base of a weak acid so is a good base_**

   b) would $AlCl_3$ be acidic or basic **_acidic_** why? **Al^{3+} can attract and bond the OH^- ion thus raising the $[H^+]$**

22. The oxidation number of oxygen in H_2O is **_–2_** of N in NH_4^+ **_-3_** of Cl in $KClO_4$ **_+7_**

23. What is the value of E° for Pb + 4 H^+ + 2 NO_3^- ' 2H_2O + 2 NO_2 + Pb^{2+} **__0.91 v__**

24. How many grams of nickel will be deposited if 1.5 mol of electrons are passed thro nickel sulfate sol'n? **____44 g___**

25. 24 125 C are passed thro a cell containing iron(III) ions. How many grams of iron will plate out? **___4.65 g__**

26. Compounds with the carbonyl group (CO) attached to at least one hydrogen are called **__aldehydes_**

27. Compounds with the carbonyl group (CO) in between 2 carbons are called **__ketones___**

28. The carboxyl group -COOH on a hydrocarbon makes a compound a **___carboxylic acid_**

29. When ethene is reacted with Cl_2 **_1,2–dichloroethane_** results via an _ **addition_** mechanism

30. Write a balanced redox equation for the rx of ethanol with acidified dichromate to form ethanal.

   3 CH_3CH_2OH + $Cr_2O_7^{2-}$ + 8 H^+ → 2 Cr^{3+} + 7 H_2O + 3 CH_3CHO