Chem 1054 Exam 3.
Name_____
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(1)(2 points) Define the following:
(a) Arrhenius acid

(b) Arrhenius base

(c) Brønstead-Lowry acid

(d) Brønstead-Lowry base

(2)(4 points) Complete the following neutralization reactions and balance them for complete neurtralization (all acidic protons neutralized, all basic units neutralized).

(a) $HClO_3 + Ca(OH)_2(aq)$ ---->

(b) $HF(aq) + NH_3$ ---->

(3)(2 points) Name the following acids and bases

(a) HNO_3

(b) H_2SO_3

(c) NH_3

(c) $HClO_2$

(4)(4 points) Write the net acid-base reactions for the following neutralizations

(a) $H_3PO_4(aq) + NaOH(aq)$ ---->

(b) $HF(aq) + Ca(OH)_2(aq)$ ---->

(5)(4 points) Write the molecular, ionic and net ionic equations for the following reactions

(a) $AgNO_3(aq) + CrCl_3(aq)$ ---->

(b) $Ba(OH)_2(aq) + FeSO_4(aq)$ ---->

(6)(4 points) A 25.00 mL sample containing oxalate($C_2O_4^{2-}$) was titrated with 0.100 M $NaMnO_4$ according to the equation below. If it took 22.10 mL of the MnO_4^- solution to neutralize the oxalate, what was the concentration of oxalate in the solution)?

$$16\ H^+(aq) + 2MnO_4^-(aq) + 5C_2O_4^{2-}(aq) \rightarrow 10CO_2\ (aq) + 2Mn^{2+}(aq) + 8\ H_2O(l)$$

(7)(2 points) Label the following as strong electrolytes, weak electrolytes, or nonelectrolytes

(a) CH_3CH_2OH

(b) Li_2SO_4

(c) NH_3

(d) $MgCr_2O_7$

(8)(4 points) For the following reaction, identify the oxidizing agent and the reducing agent. Also, which species is oxidized, and which is reduced?

$CrO_4^{2-} + S_8 \text{ ----> } SO_2 + ClO^-$

(9)(8 points) Balance the following half-reactions in acid

(a) $Cu^+(aq) \text{ ------> } Cu^{2+}(aq)$

(b) $SO_4^{2-}(aq)$ -----> $SO_3^{2-}(aq)$

(10)(4 points) Balance the following oxidation-reduction reaction in acid

$Cu^{+}(aq) + SO_4^{2-}(aq)$----> $Cu^{2+}(aq) + SO_3^{2}(aq)$

(11)(4 points) Name a reagent that you could use to separate the Ba^{2+} and Ni^{2+} from a solution of $Ba(NO_3)_3$ and $Ni(NO_3)_2$ by a precipitation. Write out the precipitation reaction and list which metal will be in the precipitate and which will be left in solution. What could you add to precipitate the metal remaining in solution?

(12)(2 points) Identify the acid, base, conjugate acid, and conjugate base in the following reaction.

$$H_2SO_4 + NH_3 \text{ -----> } NH_4^+ + HSO_4^-$$

Extra Credit (4 points): Describe one application of redox reactions.