Exam 2: 30 question types

1. Calculating simple buffers
2. Identifying buffers (after neutralization)
3. Ranking acidity and basicity based on K
4. Buffer capacity
5. Buffer neutralization calculation
6. Identifying features of a titration curve
7. Titration calculation
8. Titration calculation
9. Estimating solubility from Ksp
10. Calculating molar solubility from Ksp
11. Common ion calculation
12. Selective precipitation
13. Approximations of acid base equations
14. polyprotic acid equilibria
15. polyprotic acid calculations
16. Mass and charge balance
17. Setting up complex equilibrium problems
18. Equilibrium expressions for a polyprotic acids
19. Equilibria Calculations: dilute solutions
20. Equilibrium Calculations: sulfuric acid case
21. Equilibrium Calculations: weak polyprotic acids
22. Balancing redox reactions (in acid or base)
23. Balancing redox reactions (in acid or base)
24. Ranking oxidizing and reducing strengths
25. Assigning EC cell nomenclature
26. Assigning EC cell nomenclature
27. Calculating Ecell at standard conditions
28. Relating E, ΔG and K
29. Stoichiometry calculation from current
30. Calculating cell potentials (Nernst)

CH302 Exam 2 Spring 09 Equations and Constants

Constants:

$F = 96500$ C per mole e^{-1}

Amp = 1 Coulomb/second

$R = 8.314$ J/mol K

$R = 1.987$ cal/mol K

$N = 6.02 \times 10^{23}$

Electrochemistry equations

$E^o = E^o_{cathode} - E^o_{anode}$

$E = E^o - (0.0592/n)\log Q$

$Q = [C]^c[D]^d / [A]^a[B]^b$ $E^o_{cell} = RT \ln K / nF$

$\ln K = nFE^o_{cell} / RT$

$\Delta G^0 = -RT \ln K$

$\Delta G^0 = -nFE^0_{cell}$

$i = C/t$

Equilibrium Equations

$pH = -\log[H^+]$

$pOH = -\log[OH^-]$

$pK_a = -\log K_a$

$K_a = [H^+][A^-]/[HA]$

$K_w = [H^+][OH^-] = 10^{-14}$ (@ 25°C)

$K_w = K_aK_b$

$pH + pOH = 14$

$pKw = pK_a + pK_b = 14$

$[H^+] = (K_aC_a)^{1/2}$

$[OH^-] = (K_bC_b)^{1/2}$

$[H^+] = K_a(C_{HA}/C_{A^-})$

$[OH^-] = K_b(C_{A^-}/C_{HA})^{1/2}$

$[H^+] = (K_{a1}K_{a2})^{1/2}$

$[H^+]^2 - [H^+]C_A - K_w = 0$

$[H^+]^3 + K_a[H^+]^2 - (K_w + K_aC_{HA})[H^+] - K_aK_w = 0$

$K_{sp} = [B]^b [C]^c$