CHEM 216
Final
Jan. 1999

NAME.....

K_a acetic acid, $CH_3COOH = 1.75 \times 10^{-5}$
K_f for Ni:EDTA = 4.2×10^{18}

TABLE 4-2 Values of t for Various Levels of Probability

Degrees of Freedom	Factor for Confidence Interval				
	80%	90%	95%	99%	99.9%
1	3.08	6.31	12.7	63.7	637
2	1.89	2.92	4.30	9.92	31.6
3	1.64	2.35	3.18	5.84	12.9
4	1.53	2.13	2.78	4.60	8.6
5	1.48	2.02	2.57	4.03	6.8
6	1.44	1.94	2.45	3.71	5.9
7	1.42	1.90	2.36	3.50	5.4
8	1.40	1.86	2.31	3.36	5.0
9	1.38	1.83	2.26	3.25	4.7
10	1.37	1.81	2.23	3.17	4.5
11	1.36	1.80	2.20	3.11	4.4
12	1.36	1.78	2.18	3.06	4.3
13	1.35	1.77	2.16	3.01	4.2
14	1.34	1.76	2.14	2.98	4.1
∞	1.29	1.64	1.96	2.58	3.2

Values for α_4 for EDTA at Selected pH Values

pH	α_4	pH	α_4
2.0	3.7×10^{-14}	7.0	4.8×10^{-4}
3.0	2.5×10^{-11}	8.0	5.4×10^{-3}
4.0	3.6×10^{-9}	9.0	5.2×10^{-2}
5.0	3.5×10^{-7}	10.0	3.5×10^{-1}
6.0	2.2×10^{-5}	11.0	8.5×10^{-1}
		12.0	9.8×10^{-1}

[1] Suppose you are given a rock to weigh. You get the following readings:
24.3674, 24.3667, 24.3701, 24.3658 g
Your neighbor gets the following for the same rock:
24.2979, 24.3371, 24.3409 g

Determine the mean and standard deviation of each set of weighings and find out whether there is any statistically significant difference between the two means at the 95% probability level.

[2] A solution of 50 mL 0.450 M nickel (Ni^{2+}) is titrated with 0.350M EDTA in a buffer of pH = 8. Calculate the pM of the solution after the addition of 0, 25, equivalence volume and 90 mL EDTA solution.

How might you measure pM during the titration?

[3] Describe how you would make 100 mL of an actetate buffer pH = 4.95 using pure acetic acid and sodium hydroxide. The overall ionic strength should be between 0.1 and 0.01 M. Give the weights and volumes of all the constituents you would use and describe the procedure.

[4] Describe in detail the steps you would take, reagents you would use and any problems with determining iron in iron ore using a redox titration method. Write down equations for all the chemical transformations that take place.
Could you use this method for determining iron in drinking water? Explain.

pH
strong monoprotic acid with monoprotic base
weak monoprotic base with strong monoprotic acid
weak diprotic acid with strong monoprototic base

conductometric
0.1 M HCl with 1.0 M NaOH
1.0M HCl with 01 M NaOH
0.1 M acetic acid with 0.1 M NaOH
0.1 M HCl with 0.1 M $AgNO_3$

[5] Sketch **neat** curves for the following titrations (item in burette listed second). Label the axes: