13.1. (a) T = $100*10^{-0.038}$ = 91.62%
(b) T = 11.01%
(c) T = 39.9%
(d) T = 57.41%
(e) T = 36.73%
(f) T = 20.32%

13.5.

$$c = \frac{6.23mg\ \mathrm{KMnO_4}}{L} * \frac{10^{-3}g}{mg} * \frac{1\ \mathrm{mol}}{158.03\ \mathrm{g\ KMnO_4}} = 3.943x10^{-5}\ \mathrm{M\ KMnO_4}$$

$$A = -\log(0.195) = 0.71$$

$$\varepsilon = \frac{A}{bC} = \frac{0.71}{1.00*3.943x10^{-5}M} = 1.88x10^4\ L/mol-cm$$

13.8. (a) $A_1 = \varepsilon bc = 7.00x10^3*1.00*3.49x10^{-5} = 0.2443$
(b) $A_2 = = \varepsilon bc = 7.00x10^3*2.50*1.745x10^{-5} = 0.3054$
(c) $T_1 = 10^{-0..2443} = 0.596$, $T_2 = 10^{-0.3054} = 0.495$
(d) A = -log(0.596/2) = 0.526

13.9. e = 7000 L/mol-cm

c_{Fe} = (7.9 mg Fe/L)*(1 g/1000 mg)*(1 mol Fe/55.8 g)*(2.50 mL/50.0 mL) = $7.08x10^{-6}$ M

A = $7000*2.50*7.08x10^{-6}$ = 0.1239

13.15. (a) T = 256 mV/498 mV = 0.514 A = -logT = -log(0.514) = 0.289
(b) A = 0.289/2 = 0.1445 T = $10^{(-0.1445)}$ = 0.717
(c) A = 2*0.289 = 0.578 T = $10^{(-0.578)}$ = 0.264

14.1 Allow "s" indicate the standard and "x" the unknown. Vt is the total volume of the solution.

$A_x = \varepsilon bc_xV_x/V_t$

$A_s = \varepsilon b(c_xV_x + c_sV_s)/V_t$

$$c_x = \frac{A_xc_sV_s}{(A_s - A_x)V_x} = \frac{0.656*25.7*10.0}{(.976-0.656)*25.0} = 21.1ppm$$

14.2.

$A_x = \varepsilon b c_x V_x / V_t$

$A_s = \varepsilon b (c_x V_x + c_s V_s) / V_t$

$$c_x = \frac{A_x c_s V_s}{(A_s - A_x) V_x} = \frac{0.723 * 2.75 * 1.0}{(0.9170 - 0.723) * 5.0} = 2.05\, ppm$$

And converting from ppm to grams:

$$\frac{2.05 mg}{L} * \frac{1 g}{1000 mg} * .200 L = 4.1 x 10^{-4}\, g$$

Solving for percentage of sample:

4.1×10^{-4}g/0.5990g *100% = 0.068%

14.8 (a) $A_{365} = 0.426 = 3529 * 1.00 * c_{Co} + 3228 * 1.00 * c_{Ni}$

$A_{700} = 0.026 = 428.9 * 1.00 * c_{Co} + 10.2 * 1.00 * c_{Ni}$

$c_{Co} = (0.026 - 10.2 * c_{Ni})/428.9 = 6.06 \times 10^{-5} - 2.378 \times 10^{-2} * c_{Ni}$

$0.426 = 3529(6.06 \times 10^{-5} - 2.378 \times 10^{-2} * c_{Ni}) + 3228 * c_{Ni} = 0.2138 - 83.9 * c_{Ni} + 3228 * c_{Ni}$

$c_{Ni} = 6.41 \times 10^{-5}$ M

$c_{Co} = 5.9 \times 10^{-5}$ M

(b) Solving similarly, $c_{Co} = 1.88 \times 10^{-4}$ M and $c_{Ni} = 3.99 \times 10^{-5}$ M

15.1. In a fluorescence emission spectrum the exciting wavelength is held constant and the emission intensity is measured as a function of wavelength. In an excitation spectrum the emission intensity is monitored at one wavelength while the excitation wavelength is varied. The excitation spectrum should closely match the absorption spectrum because emission intensity in most cases is proportional to the amount of light absorbed.

15.3. For spectrofluorometry the analytical signal F is given by $F = 2.303 K' \varepsilon c P_0$. The magnitude of F and thus the sensitivity can be enhanced by increasing the source intensity P_0 or the transducer sensitivity.

15.7

	A	B
1	**Determination of NADH**	
2	Part (a)	
3	Concentration in μM	Fluorescence
4	0.100	2.24
5	0.200	4.52
6	0.300	6.63
7	0.400	9.01
8	0.500	10.94
9	0.600	13.71
10	0.700	15.49
11	0.800	17.91
12	unknown	12.16
13	Part (b)	
14	**Regression equation**	
15	Slope	22.3464
16	Intercept	3.571E-04
17	Concentration of unknown	0.544
18	Parts (c), (d), (e), and (f)	
19	**Error Analysis**	
20	s_r (standard error in *y*)	0.175
21	*N*	8
22	S_{xx}	0.42
23	s_m	0.27
24	*y* bar (average fluoresence)	10.056
25	*M* for part (e)	1
26	*M* for part (f)	3
27	Standard deviation in *c* for part (e)	0.008
28	RSD in *c* for part (e)	0.015
29	Standard deviation in *c* for part (f)	0.005
30	RSD in *c* for part (f)	0.010
31	**Spreadsheet Documentation**	
32	Cell B15==SLOPE(B4:B11,A4:A11)	Cell B24 =AVERAGE(B4:B11)
33	Cell B16=INTERCEPT(B4:B11,A4:A11)	Cell B25= Replicates part (e) (entry)
34	Cell B17=(B12-B16)/B15	Cell B26=Replicates part (f)
35	Cell B20=STEYX(B4:B11,A4:A11)	Cell B27 =E20/B15*SQRT(1/B25+1/B21+((B12-B24)^2)/((B15^2)*B22))
36	Cell B21=COUNT(B4:B11)	Cell B28=B27/B17
37	Cell B22=E21*VARP(A4:A11)	Cell B29=B20/B15*SQRT(1/B26+1/B21+((B12-B24)^2)/((B15^2)*B22))
38	Cell B23=SQRT(B20^2/B22)	Cell B30=B29/B17