Using Excel for Regression Analysis

Though the results given above provide a straightforward means for obtaining an estimate of the error for simple measurements, the actual calculations when using a calibration curve will obviously be more complex. Fortunately, spreadsheets such as Microsoft Excel can perform linear regression analysis of data with estimates of the error which are often adequate for chemical analysis. The following recipe describes how to instruct Excel to perform a regression analysis.

Part 1

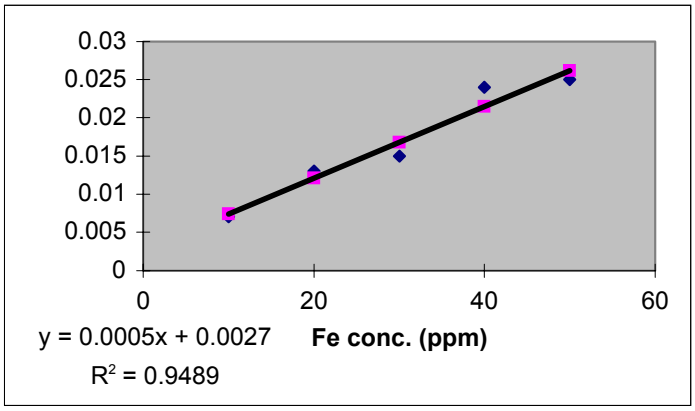
1. After entering the data (*x* and *y* in columns), click on the Tools menu.
2. You should see Data Analysis at the bottom of the menu [If you do not see it, proceed to Part 2].
3. Click on the Data Analysis option, then chooses Regression from the Dialog Box.
4. Enter the Y and X ranges.
5. Enter the upper left most cell of the output range in the Output Range field after clicking the Output Range option. The output of the analysis will be written onto the spreadsheet beginning in this cell.
6. Choose the Line Fit Plot to see a plot of the data and fit.
7. Choose other options as desired.
8. Click OK.
9. The summary output contains many statistical parameters. The values for *b* and *m* are in the first column of the third table and the values for σ_b and σ_m are in the second column. The columns are labeled "Coefficients" and "Standard Error", respectively.

The sample spreadsheet (see next page) shows you where to find the values of b, m σ_y , σ_b , and σ_m .

Part 2

If you did not see Data Analysis in the Tools menu, then you need to click on the Add-Ins option in the Tools menu, and put an X in the box next to **Analysis ToolPak**. Then click OK and Data Analysis should appear in the Tools menu. Go Back to Part 1.

Fe Conc.	A
10	0.007
20	0.013
30	0.015
40	0.024
50	0.025



Measurements

trial	absorbance	[Fe] (ppm)
1	0.018	32.55319
2	0.014	24.04255
3	0.017	30.42553

Avg. (X) 29.00709

Uncertainty 3.097529

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.974106
R Square	0.948883
Adjusted R	0.931844
Standard E	0.001992
Observatior	5

ANOVA

	df	*SS*	*MS*	*F*	*ignificance I*
Regression	1	0.000221	0.000221	55.68908	0.004982
Residual	3	1.19E-05	3.97E-06		
Total	4	0.000233			

delta 5000

sigma(y) 0.001991649

	Coefficients	*tandard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.0027	0.002089	1.292571	0.286711	-0.003948	0.009348	-0.003947689	0.009347689
X Variable	0.00047	6.3E-05	7.462511	0.004982	0.00027	0.00067	0.000269565	0.000670435

RESIDUAL OUTPUT

Observation	*Predicted Y*	*Residuals*
1	0.0074	-0.0004
2	0.0121	0.0009
3	0.0168	-0.0018
4	0.0215	0.0025
5	0.0262	-0.0012

σ_b and σ_m

y-intercept
slope (m)