

Creating a chart with Microsoft Excel 2013 (Chemistry)

After you complete all the instructions in this handout you should be able to:

- 1. Create a graph using the new Excel 2013 version.
- 2. Understand the terms used in creating a chart.
- 3. Make changes and customize a graph.
- 4. Construct a graph that looks like Figure 1.1 below.

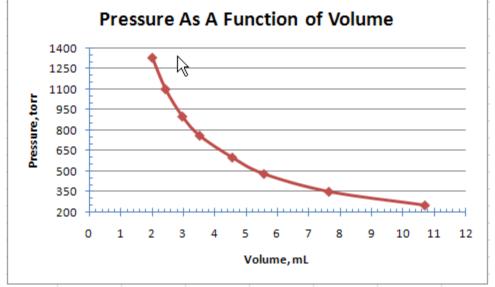


Figure 1.1 Sample Computer graph using Excel 2013

1. To begin, double-click Microsoft Excel icon on the desktop. Excel will automatically open a clean Excel sheet similar to figure 1.2 below.

FILE	но но	1000		AGE LAYOUT	FORMUL	AS DA		Module. VIEV	2013testCh V	em.xlsx - E	xcel					? 团 Chris P.	- □ Nelling -	×
Paste	* •	Calibri	- 11	I → A Å	==	87-	🛱 Wrap Text		General		•	₽		ansert →	Σ - •	AT I		
Paste		BI	<u>u</u> • 🖽 •	🕭 - 🗛 -		任王	🖽 Merge & Ce	nter 🔹	\$ • %	, • •.0	00. 00 →.0	Conditional	Format as Cell Table ≠ Styles ≠	10-01		Sort & Fi Filter * Se	nd &	
	ard 🗔		Font	G		Align	ment	G		ımber	r ₅₁	Conversion of the conversion of the second	ityles	Cells		Editing	aect *	^
A1	14	• :	× ✓	fx										- at share a				*
4	A	в	С	D	E	F	G H		I	J	ł	K L	M	N (D	P	Q	
1													-					7
2																		
3																		
4																		
5																		
6																		
7																		
8			1	1				10			1			1				
9																		
10			1		1						1							
11											_							
12																		4
11 12 13 14											-							
14																		



The data table below contains the data that you will be using in this exercise. **Volume** will be the independent variable (X axis) and **Pressure** will be the dependent variable (Y axis).

Volume, mL	Pressure, torr
(independent variable)	(dependent variable)
10.70	250
7.64	350
5.57	480
4.56	600
3.52	760
2.97	900
2.43	1100
2.01	1330



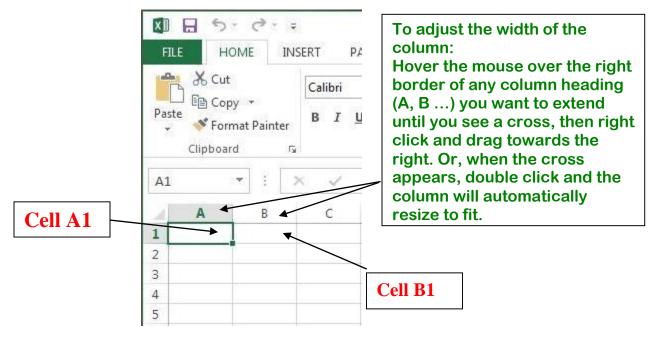


Figure 1.3

2. In cell A1 of new Excel sheet, type **Volume, mL** and in cell B1, type **Pressure, torr.** Adjust the width of the column if needed. To do this: see boxed instructions above. Enter the data from table 1.1 in the appropriate cells.

When this is done the left side of the screen should look like figure 1.4

F	ILE H	OME		INSER.	Т	PAG	SE LA	11
Pa	ste	24.23	ibri I •	- <u>U</u> - & -	11 A [*] A •	× A		aver a divers
Cli	pboard 🗔		1	Font		G.	3	AI
BS	9		÷	×	~	ţ	r æ	
1	A			В		Í.	С	
1	Volume,	mL	Pres	sure,	Torr			
2	1	10.7			250			
3	-	7.64			350			
4	5	5.57			480			
5	4	1.56			600			
6	1	3.52			760			
7		2.97			900			
8		2.43	_		1100	2		
9		2.01			1330			
10								
11								

Figure 1.4

3. Use your mouse to highlight the cells that contain data as shown in Fig 1.5

1	*	Cal	libri	÷	11	+	=	=
	ste	B	I ~	U +	1200	A G		≡ ₩
A	1	•	;	×	4	J	e æ	V
1	A			В		Ĺ	с	
1	Volume, r	mL	Pres	sure,	Torr			
2	1	.0.7			250			
3	7	.64			350			
4	5	.57			480			
5	4	.56			600			
6	3	.52			760			_
7	2	.97			900			
8	2	.43			1100			_
9	2	.01			1330			_
10						1		-

4.	Convert the data table into a	chart by clicking on the	Insert tab (Fig 1.6)
----	-------------------------------	--------------------------	-----------------------------

X	1 8 5-	¢ - =					Graphin	gModule20	13testCher
ł		INSERT	PAGE LAYOUT	FOR	RMULAS	DATA	REVIEW	VIEW	
	otTable Recomm PivotT Table	Tables	Pictures Onlin Picture Illustratio	es 💩+ *	Apps for Office * Apps	Recommer Charts		<u>*</u> *	PivotChart
A	1 *	× ✓	<i>f</i> _x Vol	ume, ml					
1	A	В	с	D	E	F	G	н	I
1	Volume, mL	Pressure, Torr							
2	10.7	250							
3	7.64	350							
4	5.57	480							
5	4.56	600							
6	3.52	760							
7	2.97	900)						
8	2.43	1100)						
9	2.01	1330							
10									
11									

Figure 1.6

The **insert** tab contains the chart group with a variety of charts you can choose from.

For this graphing lab, you will click on **scatter**, then choose <u>scatter with smooth lines</u> <u>& markers</u>. (Figure 1.7)

A screen tip displays the chart type name when you wave the pointer over any chart type. The screen tip also provides information of the chart type and when to use each one.



Figure 1.7

Note: If you want to change the chart type after you create your chart, click inside the chart. On the **Design** tab under **Chart Tools**, in the **Type** group, click **Change Chart Type**, and select another chart type.

X∎	B 5-	C - ÷	Grap	hingModule	2013testChem.	xlsx - Excel		CHAR	T TOOLS
FI	LE HOME	E INSERT	PAGE LAYOU	T FORM	IULAS DA	TA REVIE	W VIEW	DESIGN	FORMAT
len	Chart Quick	Change Colors +				I I I I I I I I I I I I I I I I I I I			
C	hart Layouts					Ch	art Styles		
Ch	art 1 💌	X V	fx						
2	A	В	С	D	E	F	G Н	I	J
	Volume, mL	Pressure, Tori	r [
	10.7	25	50		96 887 1		171		
Š.	7.64	35	50		Pr	essure, To	orr		
	5.57	48	1400	1					
	4.56	60		1					
	3.52	76	50 1200	1					4
	2.97	90	1000						
5	2.43	110	800		2				
	2.01	133	80 0 000		X				(1
)			600						
L			400			2			
2							-		
3			200						
1			0						
5			0	2	4	6	8	10	12
5			L.				1		
7									

4. The graph on the Excel sheet should appear similar to Figure 1.8

Adding a Title:

5. Now it's time to add descriptive titles to your graph so that anybody who views it will know what the graph is all about.

There are two ways to insert your title:

- A. One way is to click the Design tab, then go to **Add Chart Element**. Click the **more button** (mini arrow on the right) to see all the elements that you can add. Each option provides features that change the way graph components (X axis & Y axis) are laid out and what information they supply. In this case you would select first **Chart Title**, followed by **Axis Titles** (twice, once for Primary Horizontal, the second for **Primary Vertical**).
- B. Another way is to click the **Design tab**, then go to **Quick Layouts**. Click the **more button** (mini arrow on the right) to see all the layouts. Each option shows different layouts that change the way graph components (X axis & Y axis) are laid out. Example: Layout # 1 adds placeholders for a chart and axes titles. It also adds a legend, which can be deleted in this case, since we have only one line. You will then type the titles directly on the chart.

C. The other choice is to use the **Add Chart Element** icon (the large + beside the chart), which offers many of the same options as the **Add Chart Element** button from part 'A' of this section.

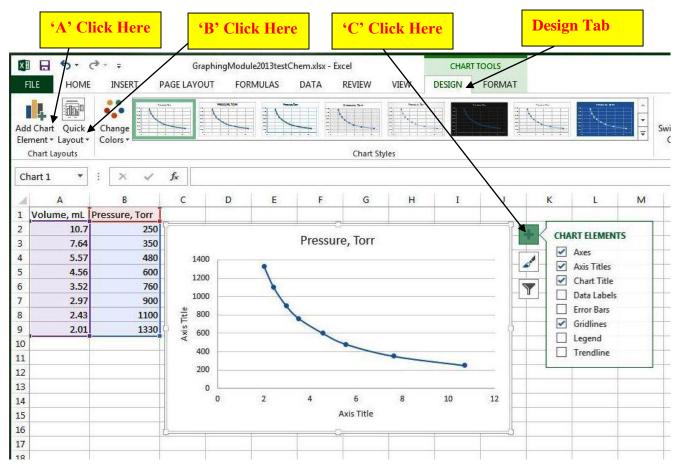


Figure 1.9

- 6. Adding titles for the chart and axes:
 - A. In the <u>Chart title box</u>, type in the title for the graph: **Pressure as a Function of Volume.**
 - B. In the <u>Horizontal axis title box</u>, type in the title for the graph: Volume (mL).
 - C. In the <u>Vertical axis title box</u>, type in the title for the graph: Pressure (Torr).

When finished, your chart should look similar to Figure 1.10.

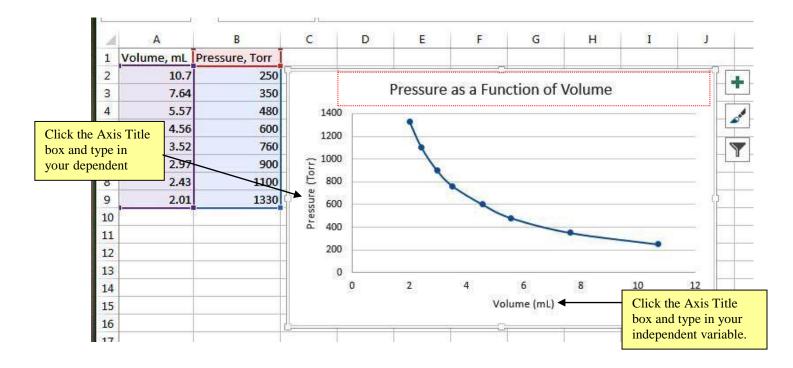


Figure 1.10

7. Click on the other different buttons or checkboxes (**Axes, Gridlines, legend and data labels**) to customize the graph. Below are some of the more commonly used categories:

Chart Title and Axis Title: These categories will allow you to type in your title and label your dependent and independent variables.

Axes: This option allows you to add, change or remove values on the x or y axes.

Gridlines: This image will allow you to adjust the gridlines on the graph.

Legend: Opening this category will allow to deselect or keep the legend.

It will also allow you to adjust the position of the legend on the page.

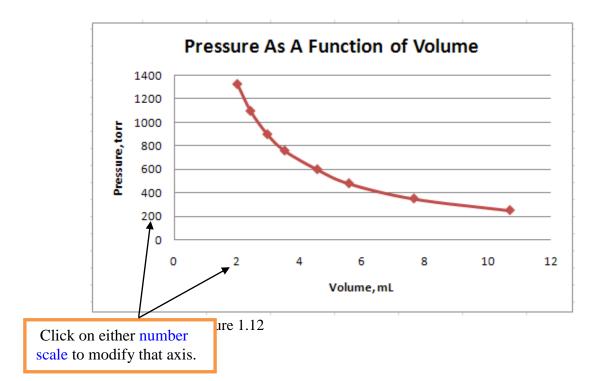
Data Labels: Clicking this tab will allow certain properties of each data point to show up on the graph. Nothing needs to be done here.

8. To Format Axis, under the Add Chart Element option (using either the button on the design ribbon or the + beside the chart), hover over the axes option (under the button) or click the arrow to the right (under the +) and choose more axis options. The 'Format Axis' menu appears to the right (figure 1.11). Left click on the number scale beside the desired axis (X or Y) to choose which axis you want to format (figure 1.12).

I J K	Format Axis	➡ ¥
Y	AXIS OPTIONS Bounds	
	Minimum 0.0	Auto
	Maximum 12.0	Auto
	Units	
	Major 2.0	Auto
D 12	Minor 0.4	Auto
	Vertical axis crosses	
	Automatic	
	🗌 🔿 Axis valu <u>e</u>	0.0
	O <u>M</u> aximum axis value	
	Display <u>u</u> nits N	lone 👻
	Show display units la	bel on chart
	Logarithmic scale Ba	10 10
	<u>V</u> alues in reverse order	
	▶ TICK MARKS	
	▶ LABELS	
	▶ NUMBER	

Figure 1.11 window before modifications

The 'AXIS OPTIONS' section allows you to modify the position of the axis and its numbering scale. The 'TICK MARKS' section allows you to modify the numeric degradations on the axis. The 'NUMBER' section allows you to convert between different types of numerical units (currency, date, time, percentage, etc.). For other options (like color, fill, effects and line size), explore the paint bucket, pentangle and size Icons under the 'AXIS OPTIONS' heading.



Complete all the axis	s options inside the forma	t axis box as follows:	See Table 1.2
-----------------------	----------------------------	------------------------	---------------

	X-axis	Y-axis
	(Independent Variable)	(Dependent Variable)
Axis Options		
Minimum	0	200
Maximum	12	1400
Major unit	1	150
Minor unit	0.2	50
Values in reverse order		
Logarithmic scale		
Major tick mark type	cross	cross
Minor tick mark type	inside	inside
Axis labels	Next to axis	Next to axis
Vertical/ Horizontal axis		
crosses:		
Axis value	0.0	200
Number		
Category	General	General
Format code	General	General
Fill	Automatic	No Fill
Line Color	automatic	automatic
Line Style	0.75 pt	0.75 pt
Shadow		
3-D Format		
Alignment	horizontal	horizontal

Tab	le	1.2
Iuo	10	1.4

When finished your **'FORMAT AXIS'** menu should look like Figure 1.13 and your chart should look like Figure 1.14 (the x-axis menu is on the left; the y-axis menu is on the right).

		//45	Format Axi		IONS
AXIS OPTIONS Bounds		^	AXIS OPTION		
Minimum	0.0	Auto	Bounds	5	
			Minimum	200.0	Reset
Maximum	12.0	Auto		1 400 0	
Units			Maximum	1400.0	Auto
Major	1.0	Reset	Units		1.1
Minor	0.2	Auto	Major	150.0	Reset
Vertical axis crosses			Minor	50.0	Reset
Automatic			Horizontal axis	s crosses	87
○ Axis valu <u>e</u>		0.0	Automat	ic	
○ <u>M</u> aximum	axis value		⊖ Axis valu		0.0
Display <u>u</u> nits	None	*	○ <u>M</u> aximur	n axis value	
Show disp	ay units label o	on chart	Display <u>u</u> nits	Nor	ne 💌
Logarithmic	scale Base	10	Show dis	play units labe	l on chart
Ualues in rev	erse order		🗌 Logarithmi	ic scale Base	10
TICK MARKS			Ualues in re	everse order	
Major type	Cross	*	▲ TICK MARKS		
	Inside		Major type	Cros	
Minor type	Inside	<u> </u>	a: 065		
LABELS			M <u>i</u> nor type	Insid	ie 🔻
<u>L</u> abel Position	Next to	o Axis 💌	▲ LABELS		
NUMBER			Label Position	Next	t to Axis 🔻
<u>Category</u>			▲ NUMBER		
General		v 0	Category		

Figure 1.13 Format Axis window after modifications

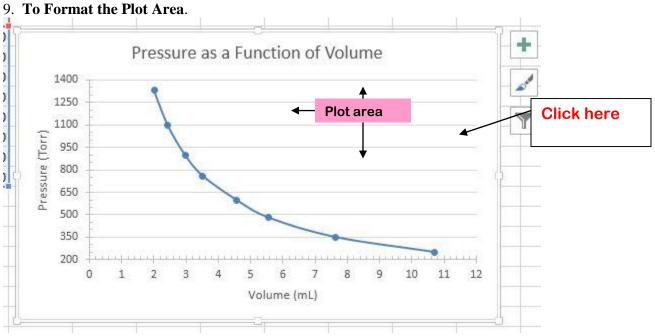


Figure 1.14 Chart after modifications

If you did not close out the **'FORMAT AXIS'** menu, Position cursor on clear region of the graph (see **Click here** box in Fig 1.14) then left click; the menu will change from **'FORMAT AXIS'** to **'FORMAT PLOT AREA'**. If you did close out the menu, then right click instead. A pull-down menu will appear, click **Formal Plot Area**.

Delete
Reset to Match Style
Change Chart Type
Select Data
3-D rotation
Format Plot Area

A 'FORMAT PLOT AREA' menu will appear on the screen similar to figure 1.15

2	Format Plot Area	×
	PLOT AREA OPTIONS 🔻	
Figure 1.15		
	▲ FILL	
	○ <u>N</u> o fill	
	○ <u>S</u> olid fill	
	○ <u>G</u> radient fill	
	O <u>P</u> icture or texture fill	
	○ P <u>a</u> ttern fill	
	Automatic	
	<u>C</u> olor	
	BORDER	
	○ <u>N</u> o line	
	○ <u>S</u> olid line	
	○ <u>G</u> radient line	
	Automatic	
	<u>C</u> olor	
	Transparency	\$
	Width	÷.
	<u>C</u> ompound type	= •
	Dash type	-

The Format Plot Area Box has the following selections:

We will use mainly the options under the **paint bucket icon**:

Fill: Allows you to select the background pattern for the plot area.

Border color: Allows you to select the style, color, and weight of the line around the plot area. Explore the options under the **Effects Pentangle icon**: allow you to adjust various effects, like **Shadow, Glow, Soft Edges, and 3-D Format.**

10. **To format the data** points and the line which connects them, position the cursor on the data points or the line and click it (or right click and choose 'Format Data Series', if you've closed the menu). If you had to right click, a pull-down menu will appear that will allow you to choose Format Data Series.

Delete
Reset to Match Style
Change Series Chart Type
Select Data
3-D Rotation
Add data Labels
Add Trendline
Format Data Series

The 'FORMAT DATA SERIES' menu will appear on the screen. See figure 1.16, left hand side shows the options for formatting the line and the right hand side shows the options for formatting the markers (under the 'LINE' and 'MARKER' options)

Format Data Series	Format Data Series
 LINE Mo line Solid line Gradient line Automatic 	 LINE MARKER OPTIONS Automatic None Built-in
Color▲Iransparency0%Width1.5 pt	Type • • Size 5 ‡
<u>C</u> ompound type <u>D</u> ash type ■ ▼	 <u>Solid fill</u> <u>G</u>radient fill <u>P</u>icture or texture fill
Cap type Round 🔻	○ P <u>a</u> ttern fill

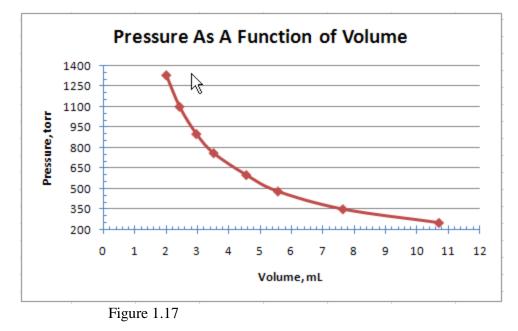
Figure 1.16 Format Data Series window

There will be several selections inside the 'FORMAT DATA SERIES' Menu, but we will use mainly the submenus 'LINE' and 'MARKER' under the **Paint Bucket Icon**. Most of these are similar to the options we've used previously (**Fill, Border, Shadow, Glow, etc**), but of special interest is the 'Marker Options' choice, which allows you to change the shape of your data points in the graph.

11. You may customize your data points as you prefer.

Line: Choose solid followed by the style, color, and weight that you like. The appearance of the line will appear under sample if you choose custom.

Marker: This will format the symbol for each data series. Choose the shape of the symbol that you like best. If you choose the same color for the foreground and background, the symbol will be filled and solid. If you choose a dark color for the foreground with light color (white) for the background the result is an open symbol.



The other choices do not apply to this data but feel free to click these tabs to be familiar.

12. To add your name:

Select the graph by clicking on a blank space. Click on the **Insert tab** then click on the **down arrow** under **Text** and choose **Header & Footer** (Figure 1.18).

The Page set-up box will be displayed. See Figure 1.19

Click h	ere (1)										
K → · · · · · · · · · · · · · · · · · ·		odule2013testChem		CHAR IEW DESIGN	TOOLS				? I	🗄 — 🗖 P. Nelling 🔻	_
			1	***		<u> </u>		7	4	Ω	
PivotTable Recommended Ta PivotTables		Apps for Rec	ommended Charts Charts	PivotChart	Power View Reports	Line Column Sparklines	Loss	licer Timeline Filters	Text	Symbols *	

Then Click

here (2)

Clicking on the down arrow under '**Text**' brings up the following options box:

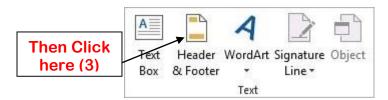


Figure 1.18 Finding and opening the Header Menu.

Page Setup				? ×
Page Margins	Header/Footer C	.hart		
He <u>a</u> der:				I
(none)				•
	<u>C</u> ustom Hea	der C <u>u</u> stom	Footer	
<u>F</u> ooter:				
(none)				•
				1
Different odd an	d even pages			
Different first page				
Scale with docum				
🔽 Align with page <u>I</u>	<u>m</u> argins			
		Print	Print Previe <u>w</u>	Options
			ОК	Cancel

Figure 1.19 Page Set-up box

Click **Custom Header** and the Header box will appear

Header			? 🛛
Header			
To format text: select the text, then To insert a page number, date, time, t insertion point in the edit box, the To insert picture: press the Insert Pict cursor in the edit box and press the	île path, filename, or tab nan n choose the appropriate but ure button. To format your p	ne: position the ton.	
А		📄 🗐 🗔 🔕 🤣	
Left section:	Center section:	Right section:	
			<
			DK Cancel

Figure 1. 19 Header window

Type your name and other information required by your instructor in the **left section**. Leave other sections as is (unless instructed otherwise by your instructor). Click **OK** twice.

13. To print your graph.

Choose the FILE menu on the top left corner of the screen.

In the new menu, click **print** and then **print** again to print your graph (Figures 1.20 and 1.21).

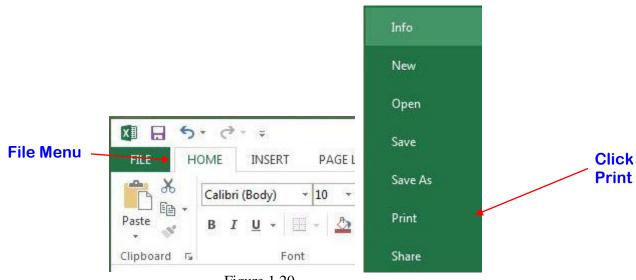


Figure 1.20



Figure 1.21

Caution: Do not close until you have your print-out!

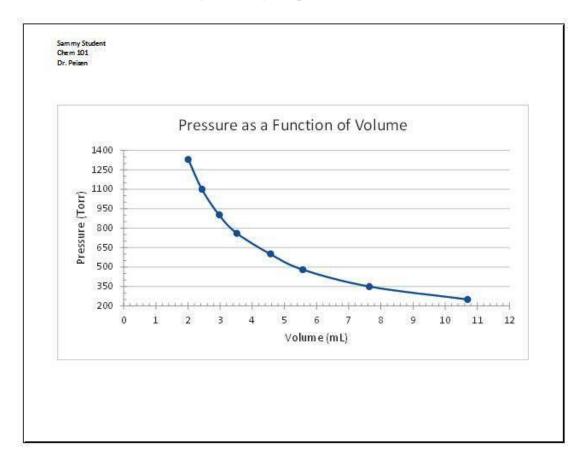


Figure 1.22: Your finished graph, complete with header.

Sources: Microsoft Excel 2013 Updated 6/2014