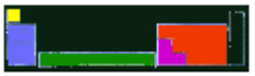
Revised August 2012



AP LAB 6b: Boyle's law and Charles' law

Boyles law

The data in the shaded columns below shows the variation in pressure and volume for a fixed mass of gas at a constant temperature in ten different experiments**. The units of pressure and volume vary in each experiment.**

	Pressure				Volume			
Experiment	**Value**	**Unit**	**Value**	**atm**	**Value**	**Unit**	**Value**	**mL**
1	40.00	mmHg		atm	12.30	L		mL
2	43.54	mmHg		atm	11.30	L		mL
3	164.0	mmHg		atm	3.000	L		mL
4	123.0	mmHg		atm	4.000	L		mL
5	8.786	mmHg		atm	56.00	L		mL
6	10.93	Torr		atm	45.00	L		mL
7	27.64	Torr		atm	17.80	L		mL
8	34.00	Torr		atm	14.50	L		mL
9	0.02800	atm	0.028	atm	23430	mL	23430	mL
10	0.07400	atm	0.074	atm	8786	mL	8786	mL

Task 1

Complete the table by converting (where necessary) the various pressures given to atmospheres (atm) and by converting (where necessary) the various volumes given to milliliters (mL).

Task 2

Use Excel to plot and print a graph of Volume in mL (x axis) and Pressure in atm (y axis). Use whatever titles, axes labels and grid lines you feel appropriate to enhance the graph. (**It will help to sort the data into ascending numerical order of volume**).

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Charles' law

The data in the shaded columns below shows the variation in temperature and volume for a fixed mass of gas at a constant pressure in 10 different experiments.

	Temperature				Volume	
Experiment	**Value**	**Unit**	**Value**	**K**	**Value**	**Unit**
1	200.	**^{o}C**		**K**	3.10	L
2	-242	**^{o}C**		**K**	0.200	L
3	-227	**^{o}C**		**K**	0.300	L
4	-136	**^{o}C**		**K**	0.900	L
5	536	**^{o}C**		**K**	5.30	L
6	215	**^{o}C**		**K**	3.20	L
7	2.00	**^{o}C**		**K**	1.80	L
8	627	**^{o}C**		**K**	5.90	L
9	658	**^{o}C**		**K**	6.10	L
10	-273	**^{o}C**		**K**	0.00	L

Task 3

Complete the table by converting ^{o}C to Kelvin for each experiment.

Task 4

Use Excel to plot and print a graph of Temperature **in ^{o}C** (x-axis) and Volume in L (y-axis). Use whatever titles, axes labels and grid lines you feel appropriate to enhance the graph.

Task 5

Use Excel to plot and print a graph of Temperature **in K** (x-axis) against Volume in L (y-axis). Use whatever titles, axes labels and grid lines you feel appropriate to enhance the graph.

Analysis of results

Boyle's law

1. Calculate a value of a constant in units of atm mL.

2. Use the constant or the graph to complete the table below for this particular gas.

Pressure in atm	Volume in mL
0.01200	
	23480
0.4500	

Charles' law

3. Use the graphs to find the intercept on the x-axis for both the **^{o}C** plot and the **K** plot.

4. What is the value for volume at the intercept on the x-axis? What can be said about this volume?

5. The intercepts you have recorded in question #3 represent a particular temperature. What is the significance of this temperature?