**TITLE: Gases laws II**

OBJECTIVES: Obtain the mathematical expression of on of the gases laws

MATERIALS:

* Schlenk tube
* Adapter for pressure sensor
* Pressure sensor
* Temperature sensor
* LoggerPro o r PC interface
* Cake pan
* Magnetic stirrer and heater

SECURITY:

* Use goggles.
* Be careful with the heater in order to avoid burnings.

PROCEDURE:

1. Set up the Schlenk tube with vaseline, the stopcock and the adapter. Secure all the joints with rubber bands.
2. Connect pressure sensor to Schlenk tube through the adapter.
3. Connect both sensors to LoggerPro or the PC.
4. Fill the cake pan with some water and dip the Schlenk tube in it horizontally.
5. Put the temperature sensor into the water.
6. Switch the magnetic stirrer on.
7. Begin to record data every 5 seconds during around 10 minutes.
8. Switch the heater on taking care that temperature does not rise too fast. If temperature gets to 80 ºC, switch the heater off and stop the experiment.
9. Once finished, disassemble the Schlenk tube and clean up the vaseline of the joints with some paper.

TASKS:

1. From the raw data obtained in the experiment, get at least 8 pairs of pressure-temperature data and make a table with them.
2. Find out what relationship exists between the measured variables and what gas law you have probed. REFERENCE!
3. Make any pertinent graph of your data.
4. Explain the meaning of your results and write out your conclusion, including if possible, data from the bibliography.
5. Evaluate the procedure in respect to precision and accuracy of the results
6. . Indicate weaknesses and sources of error and improvements for them.

ASSESSMENT CRITERION: C

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| 7-8 | The student is able to:  i. **correctly collect, organize, transform and present** data in numerical and/or visual forms  ii. **accurately interpret** data and **explain** results **using correct scientific reasoning**  iv. **evaluate** the validity of the method based on the outcome of a scientific  investigation  v. **explain** improvements or extensions to the method that would benefit the  scientific investigation. | The student registers in a well formatted table (title, labeled columns including magnitudes and units) the raw and/or processed data obtained in the lab.The student plots correctly (title, axes labelled with magnitudes and units, right scale, points well drawn, best fit line present) the raw and/or processed data obtained in the lab.  * The calculations are right and an example of them is shown. * The student explains scientifically the trend/pattern observed. * The student gets a main conclusion from a right interpretation of the results. * The conclusion is argued with comments on precision and accuracy of the results, and, when applicable, of the percentage difference between the obtained value and the awaited one. * The student establishes the validity of the method, discussing its implications and limitations (precision, accuracy, etc.) based on the right interpretation of the results. * The student explains in detail two or more non trivial sources of error or weaknesses of the method. * The student explains in detail realistic improvements for each mentioned weaknesses and/or extensions of the method that would benefit the investigation. |