**Name: Date:**

**Lab session: Calculating the ideal gases constant, R**



The ideal gas equation states that:

**Units**: Pressure (atm), volume (l), number of moles (mol), temperature (K) an R (atm l / K mol)

We will use a simple experiment to calculate the value of the gas constant, R. To do this we will need to produce a gas and measure P, V, T and n.

Write the balanced equation

 Magnesium + Hydrochloric acid 🡪 Magnesium Chloride + Hydrogen

1. Weigh one of the pieces of magnesium on the precision balance.
2. Attach the piece of magnesium to the copper wire.
3. Fill the beaker with tap water (almost full).
4. Pour about 4 mL of concentrated hydrochloric acid (reagent in excess) into the graduated test tube.
5. Fill up the graduated test tube with distilled water, pouring it slowly to avoid possible mix and spread of concentrated 5 M hydrochloric acid. (HCl has a greater density so should remain mostly at the bottom of the tube.)
6. Place the stopper with the Mg into the top of the graduated test tube. (So that the piece of magnesium is inside)
7. Quickly invert the tube in the beaker of water.
8. Allow the reaction to proceed as the HCl passes over the Mg.(The released gas should be collected inside the tube, displacing the water, and enabling a measurement of volume)
9. When the reaction has finished, match the level of gas inside the tube with the level of water in the beaker (so that we can assume the pressure inside the tube is equal to external pressure) and and record the volume.
10. Take note of the water temperature and atmospheric pressure (which matches the gas inside the tube).
11. Pour the water and reaction mixture into the sink and repeat the experiment.

Pre lab session:

1.- Balance the equation and add the states.

2.- Which gas is produced?

3.- What is the purpose of this experiment?

4.- When you calculate n, the number of moles, the number of moles of which substance are you calculating? Explain your answer.

5.- Draw the steps you will take in the lab as a comic with 6 boxes.

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**Lab report**

1. ***Results****:*
	1. *Tables of results with units and other relevant data (observations).*
	2. *Explained step-by-step calculations and consideration of DPs and SFs.*
2. ***Conclusion****:*
	1. *State final result.*
	2. *Calculate the % error in your experiment and comment on it.*
3. ***Evaluation****:*
	1. *Consider areas where error may be present in the procedure and state whether it is random error or systematic error.*
	2. *Explain how we could minimise or remove these sources of error.*
	3. *Include photos to aid explanations (and make your blog more engaging!).*

*ASSESMENT CRITERIA CRITERION C*

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| *7-8* | *O The student is able to:**oi. Obtain, organize, transform and correctly present data in numerical or visual formats**oii. Interpret data accurately and explain the results through proper scientific reasoning**oiv. Assess the validity of the method according to the result of scientific research**ov. Explain improvements or extensions of the method that would benefit scientific re* | *O The student records in a properly formatted table (title and columns labeled with quantities and units) raw data and / or processed obtained in the laboratory.**O Numerical calculations required are correct and the student gives an example of them.**O The student draws a main conclusion from the correct interpretation of the results.**O The conclusion is argued with comments on the precision and accuracy of results, and if applicable, the percentage difference between the value obtained and expected (error calculation).**oThe student establishes the validity of the method used, weighing the implications of it and limitations (precision, accuracy, etc.), from the correct interpretation of the results.**oThe student sets out in detail two or more possible sources of error or weaknesses of the nontrivial results related to the method used.**oThe student sets realistic detail for each of the weaknesses mentioned and / or extensions of the method would result in better research improvements.* |