Gas Laws Rubric

	Level 4	Level 3	Level 2	Level 1	Level 0
Q1. Reporting P' _i and	The table is	All the data is	All the data is	All the data is	The table is not
P' _f for the reactions	complete, and the	included and there is	included, there	included, there	filled or there
with known amounts	data is reported	one error in the	are two errors in	are three errors	are more than
of CaCO₃ (1 point)	with the correct	significant figures	the significant	in the	three errors in
	number of	(0.75 points).	figures (0.5	significant	significant
Using the values from	significant figures		points).	figures (0.25	figures (0
Tables 1 and 3 in your	(1 points).			points).	points).
Data Sheet, fill in the					
table below with the					
correct number of					
significant figures.					
Q2a). Calculations.	1. Three sets of	There is one or two	There are two to	There are up to	There are
Determining the	calculations are	errors or omissions	three errors or	four errors in	multiple errors
volume of the system	present and are	in the items from	omissions in the	the items from	or omissions in
(<i>V</i>) (4 points)	correct.	Level 4 (3 points)	items from Level	Level 4 (1	the items from
			4 (2 points)	point)	Level 4 (0
Calculate the volume of		For example: The			points)
your system for each	included in all the	explanations are			
trial using the equation	calculations.	present but			
provided in the Lab		somewhat unclear			
Manual. Show your	3. The answers to				
calculations and	whether the	One or two units are			
include units.	calculated volume	missing from the			
	values make	calculations			
Look at the Table 1 in	sense based on				
your Data Sheet and	the original				
ask yourself if the	estimate from the				
	Data Sheet are				

volumes you have calculated make sense. Explain your choice. *Partial points may be given withing each Level	given and are correct. 4. The required explanations are given and are clear and correct. (4 points)				
Q2 b) Report the calculated volume for each trial and the average volume in the table below with the correct number of the significant figures.	The table is complete, and the data is reported with the correct number of significant figures (1 points).	All the data is included and there is one error in the significant figures (0.75 points).	All the data is included, there are two errors in the significant figures (0.5 points).	All the data is included, there are three errors in the significant figures (0.25 points).	The table is not filled or there are more than three errors in significant figures (0 points).

Q.3 a) Determination	1. Three sets of	There is one or two	There are two to	There are more
of the n _{CO2} produced	calculations are	errors or omissions	three errors or	than 3 errors or
from the antacid	present and are	in the items from	omissions in the	omissions in
samples	correct.	Level 4 (2 points)	items from Level	the items from
			4 (1 point)	Level 4 (0
Using the average	2. The units are	For example: Two		points)
volume from the table	included in all the	units are missing		
in Q2 b) , calculate the	calculations. (3	from the		
$n_{\rm CO2}$ produced from a	points)	calculations		
portion of antacid table				
in each trial and show		OR		
your calculations				
below. Please include		One calculation is		
units. (3 points)		missing		
*Partial points may be				
given withing each				
Level				

Q3 b) Report the n_{CO2} for each trial with the correct number of significant figures. (1 point)	The table is complete, and the data is reported with the correct number of significant figures (1 points).	All the data is included and there is 1 error in the significant figures (0.75 points).	All the data is included, there are 2 errors in the significant figures (0.5 points).	All the data is included, there are 3 errors in the significant figures (0.25 points).	The table is not filled or there are more than 3 errors in significant figures (0 points).
Q.4a) Number of moles and mass of CaCO₃ in each portion	1. The table is complete, and the values correspond	There is one or two errors or omissions in the items from	There are two to three errors or omissions in the		There are more than 3 errors or omissions in
of the antacid tablet Using the n_{CO2} values	to the units (for example, 0.400 g and not 400 g).	Level 4 (2 points) For example: one	items from Level 4 (1 point)		the items from Level 4 (0 points)
from Q3, calculate the n_{CaCO3} in each portion of	2. The data is	error in significant figures and one value			politisy
the antacid tablet used as well as the corresponding mass of	reported with the correct number of significant figures	missing OR			
CaCO3, m_{CaCO3} , and report it in the table	3. The answers to	The explanation is			
below. Look at the Table 9 in your Data Sheet and ask yourself if the	whether the calculated volume values make	not provided			
amounts of CaCO₃ you have calculated make	sense based on the original				
sense. (3 points) *Partial points may be given withing each Level	estimate from the Data Sheet are given and are correct.				

	4. The required explanations are given and are clear and correct. (3 points)				
Q4b) w/w% of CaCO3	The table is	All the data is	All the data is	All the data is	The table is not
in the tablet	complete, and the	included but there is	included, but	included, but	filled or there
0-1	data is reported	one error in the	there are two	there are three	are more than
Calculate the w/w % concentration of CaCO ₃	with the correct number of	significant figures, or one value is reported	errors in	errors on	three errors in
in for each antacid	significant figures.	incorrectly (1.5	significant figures, or two	significant figures, or three	significant figures, or more
portion. (2 points)	The reported	points).	values reported	values reported	than 3 values
portion. (2 points)	values are correct.	points).	incorrectly (1	incorrectly (0.5	reported
	(2 points).	OR	point).	points).	incorrectly or
	,		. ,	. ,	missing (0
		One value is missing	OR		points).
		(1.5 points)			
			There are two		
			values missing (1		
			point).		
OF The emount of	The table is	All the details	All the details	All the data is	The table is not
Q5. The amount of CaCO₃ in ONE antacid	The table is	All the data is included but there is	All the data is included, but	All the data is included, but	The table is not filled or there
tablet (2 points)	complete, and the data is reported	one error in the	there are two	there are three	are more than
tablet (z politis)	with the correct	significant figures, or	errors in	errors on	three errors in
	number of	one value is reported	significant	significant	significant
	significant figures.	incorrectly (1.5	figures, or two	figures, or three	figures, or more
		points).	values reported	values reported	than 3 values

	The reported values are correct. (2 points).	OR One value is missing (1.5 points)	incorrectly (1 point). OR There are two values missing (1 point).	incorrectly (0.5 points).	reported incorrectly or missing (0 points).
Q6a) Presence of an outlier Do you have an outlier value, - the value that differs greatly from the other two calculated values? Please explain. (1 point)	The answer is given and explained properly and clearly (1 point)		The answer is given but not properly explained (0.5 points)		The answer is given but it is completely incorrect (0 points)
Q6b) Possible sources of poor reproducibility What would be a possible source of poor reproducibility in this experiment. Provide TWO possible reasons. Errors such as spilling half of the amount on the way to the flask are not acceptable reasons. (2 points)	Two valid reasons are provided (2 points)	Two valid reasons are provided but are not completely applicable (1.5 points).	Only one valid reason is provided OR Two reasons are provided, but one reason is invalid or not applicable (1 point).	One valid reason is provided but it is not completely applicable (0.5 points)	No answer is given OR Two reasons are provided, but both are invalid or not applicable (0 points).

Data Sheet (3 points)	Data sheet is complete, no information is missing. The TA signature is present. The data sheet is submitted on time (3 points).	Data sheet is mostly complete, but some data is missing (up to 10-20%). The TA signature is present. The data sheet is submitted on time (2 points).	Data sheet is partially complete, up to 30% of data is missing. The TA signature is present. The data sheet is submitted on time (1 point).	Data sheet is partially complete, up to 50% of data is missing. The TA signature is present. The data sheet is submitted on time (0.5 points).	Data sheet is incomplete (more than 50% of data is missing), or it is not submitted or submitted after the last deadline, or it is not signed by the TA (0 points).
Personalized procedure (2 points)	The procedure is complete or mostly complete and personalized. The TA signature is present. (2 points)		The procedure is missing up to 50% of the steps. The TA signature is present. (1 point)		The procedure is copied directly from the manual, or the procedure is not submitted, or submitted past the last deadline, or it is not signed by the TA (0 points).
Total # points:	25 points		<u> </u>		pointoj.