09 Gas Laws Lab (4959478)

Question	1 2 3 4 5 6 7 8 9 10

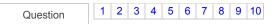**Description**

This lab has three parts: Boyle's Law, Gay-Lussac's Law, and Charles's Law.

Part 1: Boyle's Law

Materials: iMac computer, Data Link, Gas Pressure Sensor, 12 mL syringe, Logger lite software

Procedure:

1. Connect the Data Link to an empty USB port on the back of the iMac computer.
2. Connect the Gas Pressure Sensor to the Data Link.
3. Pull the syringe so that the top of the black plastic ring reads 7 mL and connect the syringe to the Gas Pressure Sensor with a gentle twist.
4. Open the program: "Logger Lite".
5. Using the file menu, open the Physical Science folder and then open the experiment with the title: Pressure and Volume.
6. Press the green "Collect" button.
7. Press the "keep" button. Enter the volume (7.0)
8. Adjust the syringe volume to 6 mL and press the "keep" button. Enter the volume (6.0).
9. Adjust the syringe volume to 5 mL and press the "keep" button. Enter the volume (5.0).
10. Adjust the syringe volume to 4 mL and press the "keep" button. Enter the volume (4.0).
11. Adjust the syringe volume to 3 mL and press the "keep" button. Enter the volume (3.0).
Do not go past 3 mL to avoid damage to the sensor.
12. Adjust the syringe volume to 8 mL and press the "keep" button. Enter the volume (8.0).
13. Adjust the syringe volume to 9 mL and press the "keep" button. Enter the volume (9.0).
14. Adjust the syringe volume to 10 mL and press the "keep" button. Enter the volume (10.0).
15. Adjust the syringe volume to 11 mL and press the "keep" button. Enter the volume (11.0).
16. Adjust the syringe volume to 12 mL and press the "keep" button. Enter the volume (12.0).
17. Press the red button to stop collecting data.
18. Press the "scale" button.
19. Take a photo of your graph for question 2 and answer question 3.
20. Enter the data in question 4 and calculate the value of K (volume x pressure) for each trial.

Part 2: Gay Lussac's Law

Materials: iMac computer, Data Link, Gas Pressure Sensor, Temperature Sensor, clear and colorless tubing, rubber stopper with valve, Logger Lite software, 1000 mL beaker, 125 mL Erlenmeyer flask, tap water, ice, hot plate with ring stand rod, test tube clamp

Procedure:

1. Connect the Data Link to an empty USB port on the back of the iMac computer.
2. Connect the Gas Pressure Sensor to the Data Link. Connect the clear and colorless plastic tube to the end of the gas pressure sensor and then connect the tube to the rubber stopper. Place the stopper in a 125 mL Erlenmeyer flask and secure the stopper. Open the valve located on the top of the stopper and then close the valve to make sure the pressure is equalized.
3. Connect the temperature probe to another empty USB port on the back of the iMac computer.
4. Clamp the temperature probe onto the hot plate rod using a test tube clamp.
5. Obtain about 700 mL of iced tap water in a 1000 mL beaker. Place the beaker on the hot plate.
6. Place the 125 mL Erlenmeyer flask down into the water and lower the temperature probe and clamp over the flask to keep the flask submerged up to the stopper.(See image in Instructions below)
Open the program: "Logger Lite". Using the file menu, open the experiment with the title: 31 Pressure and Temperature.
6. Press the green "Collect" button.
7. Press the "keep" button.
8. Turn on the hot plate and adjust the temperature to 300 C. Watch the temperature and when the temperature rises about 7 degrees press the "keep" button.
9. Keep watching the temperature and press the "keep" button after each 7 degree rise in temperature until you have 7 data points (about 50 degrees).
10. Press the red button to stop collecting data. Turn off the hot plate.
11. Press the "scale" button.
12. Take a photo of your graph for question 5 and answer question 6.
13. Enter the data in question 7 and calculate the value of K (Pressure/Temperature) for each trial.

Part 3: Charles's Law

Materials: iMac computer, Data Link, Gas Pressure Sensor, Temperature Sensor, clear and colorless tubing, rubber stopper with valve, Logger Lite software, 1000 mL beaker, 125 mL Erlenmeyer flask, tap water, ice, hot plate with ring stand rod, test tube clamp, 20 mL syringe

Develop a procedure to create a graph of Charles's Law. Use the same apparatus you have in place from Gay Lussac's Law, starting with a high temp and ending with a lower temp.

1. Open the program: "Logger Lite". Using the "Experiment" menu, choose "Data Collection" and set the mode to "Events With Entry". Choose "1" for the number of columns, set the name to "Volume", short name to "V" and units to "mL", and then click "Done".
2. Click the green "Collect" button, and then click "Keep". Note the pressure. The goal is to keep the pressure constant throughout the experiment. The volume of the 125 mL flask is 150 mL. Allow the temperature to drop about 5 degrees between each reading.
3. Using the "Insert" menu, select "graph". Resize the graph and take a photo of the graph on question 8 and answer question 9.
4. Enter the data in question 10 and calculate the value of K (Volume/Temperature) for each trial.

Instructions

---

1. Question Details   Lab Partners [1837468]

Enter the name(s) of your lab partner(s). (If you worked by yourself, enter "none").

---

2. Question Details   Gas Laws Lab 01 [2757619]

Upload your Pressure vs. Volume graph. [Choose File] no file selected

---

3. Question Details   Gas Laws Lab 02 [2757673]

What is the relationship between pressure and volume of a gas?

- ○ direct

- ○ inverse

Describe the shape of the pressure vs. volume of a gas graph.

- ○ linear

- ○ curved

What is constant in this experiment?

- ○ temperature

- ○ volume

- ○ pressure

4.   Question Details   Gas Laws Lab 03 [2759812]

Trial	Volume (mL)	Pressure (KPa)	Constant (K)
1	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
2	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
3	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
4	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
5	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
6	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
7	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
8	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
9	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐
10	4.0 ✓ ☐	4.0 ✓ ☐	4.0 ✓ ☐

Calculate the average value of the constant K:(round to two significant figures) 4.0 ✓ ☐

5.   Question Details   Gas Laws Lab 04 [2783224]

Upload your Pressure vs. Temperature graph.   [Choose File] no file selected

6.   Question Details   Gas Laws Lab 05 [2783225]

What is the relationship between pressure and temperature of a gas?

○ inverse

○ direct

Describe the shape of the pressure vs. temperature of a gas graph.

○ linear

○ curved

What is constant in this experiment?

○ temperature

○ volume

○ pressure

7.   Question Details   Gas Laws Lab 06 [2783226]

Trial	Temperature (K)	Pressure (KPa)	Constant (K)
1	4.0 ✓	4.0 ✓	4.0 ✓
2	4.0 ✓	4.0 ✓	4.0 ✓
3	4.0 ✓	4.0 ✓	4.0 ✓
4	4.0 ✓	4.0 ✓	4.0 ✓
5	4.0 ✓	4.0 ✓	4.0 ✓
6	4.0 ✓	4.0 ✓	4.0 ✓
7	4.0 ✓	4.0 ✓	4.0 ✓

Calculate the average value of the constant K: 4.0 ✓

---

8.   Question Details   Gas Laws Lab 07 [2796830]

Upload your Volume vs. Temperature graph. [Choose File] no file selected

---

9.   Question Details   Gas Laws Lab 08 [2796831]

What is the relationship between volume and temperature of a gas?

○ direct

○ inverse

Describe the shape of the volume vs. temperature of a gas graph.

○ curved

○ linear

What is constant in this experiment?

○ temperature

○ volume

○ pressure

---

10.   Question Details   Gas Laws Lab 09 [2796832]

Trial	Temperature (K)	Volume (mL)	Constant (K)
1	4.0 ✓	4.0 ✓	4.0 ✓
2	4.0 ✓	4.0 ✓	4.0 ✓
3	4.0 ✓	4.0 ✓	4.0 ✓
4	4.0 ✓	4.0 ✓	4.0 ✓
5	4.0 ✓	4.0 ✓	4.0 ✓
6	4.0 ✓	4.0 ✓	4.0 ✓

Calculate the average value of the constant K: 4.0 ✓

Assignment Details

Name (AID): **09 Gas Laws Lab (4959478)**
Submissions Allowed: **5**
Category: **Homework**
Code:
Locked: **Yes**
Author: **Ryan, Matt (** mryan@allsaintsschool.org **)**
Last Saved: **Feb 12, 2018 08:53 AM CST**
Permission: **Protected**
Randomization: **Person**
Which graded: **Last**

Feedback Settings
Before due date
Question Score
Assignment Score
Publish Essay Scores
Question Part Score
Mark
Add Practice Button
Help/Hints
Response
Save Work
After due date
Question Score
Assignment Score
Publish Essay Scores
Key
Question Part Score
Solution
Mark
Add Practice Button
Help/Hints
Response