

Week 7 Assignment

A. Watch Boyle's Law and answer questions pertaining to it:

<https://www.youtube.com/watch?v=N5xft2flqQU>

1. In this demonstration, did the volume of the balloon increase or decrease?

The volume of the balloon increases as the pressure in the balloon decreases

2. What relationship is being demonstrated in this experiment?

That Volume of fixed mass of a gas at constant temperature is inversely proportional to pressure.

3. In this demonstration, did the volume of the marshmallow peep increase or decrease?
Explain your answer

The volume of the peep increases as the vacuum is applied this is because there is a decrease in pressure and this results to the volume of the gas expanding. As the vacuum is released the pressure increases resulting to a decrease in volume

4. Why does the volume of the shaving cream increase when Pressure is dropped (or lowered)?

The shaving cream contains air trapped in a soap mixture and when the vacuum is introduced the pressure outside is lower than the pressure inside this makes the shaving cream to expand (volume increase) to equalize the pressure

B. Watch both demonstrations of Charles Law and answer questions pertaining to them.

(1) <https://www.youtube.com/watch?v=Gi5wPnkBEYI>

(2) https://www.youtube.com/watch?v=5M8GR6_zlps

1. In the first demonstration, what chemical was used to demonstrate the Charles law.
Why was it used?

Liquid Nitrogen .It has a low freezing point(Has a very low temperature)

2. In the second demonstration what pressure was used to demonstrate Charles law?

Constant atmospheric pressure

3. In the second demonstration, why did the water rise in the flask after it was inverted into the beaker filled with water?

As the gas cools the atmospheric pressure pushes water up to the flask.

4. In the second demonstration, how much water was collected in the flask that was inverted into the beaker filled with water?

26.5ml

C. Watch the demonstration of Gay-Lussac's Law and answer questions pertaining to it:

<https://www.youtube.com/watch?v=1pVVZGOBIVg>

1. When the Gay Lussac's device was inserted in boiling water, what was the pressure that was recorded?
948mmHg
2. What happened to the pressure of the gas in the Gay Lussac's apparatus when it was dipped in regular water + boiling water? Did it increase or decrease?

The pressure decreased with a decrease in temperature

3. In this experiment which of the following relationships are being tested?
 - a. Relationship between Volume and Temperature
 - b. Relationship between Volume and Pressure
 - c. Relationship between Pressure and Temperature**

D. Watch the demonstration of Boiling water until it freezes under vacuum:

<https://www.youtube.com/watch?v=y4BGV7-1lhs>

1. In this video demonstration, which of the following variables were lowered (or changed) to get water to boil?
 - a. Volume
 - b. Pressure**
 - c. Temperature
2. When pressure dropped did the boiling point of water increase or decrease?

The boiling point decreased

3. Did the water freeze in this demonstration and if it did at what temperature did it freeze?

The water freezes at 0 °C

4. If the temperature increases, does the water vapor pressure increase or decrease?

The vapor pressure increases with increase in temperature

5. In this demonstration, at what pressure did the ice crystals start to form in the beaker?

3-mmHg

6. In this demonstration as soon as vacuum was applied, bubbles were first visible that left the beaker. What molecules were escaping water?

Water molecules

7. In the second experiment what molecule was added to water to make water boil smoothly (Carbon)

Charcoal

8. What was the name of the desiccant that was used in this demonstration and what was the purpose of using the desiccant?

Anhydrous magnesium sulphate

so as to absorb the water vapor and maintain a high vacuum state

9. Give another example where a desiccant is used.

Food industry during packaging to remove moisture

10. Breathing is an example of which of the following gas laws?

a. Charles Law

b. Boyle's Law

c. Gay Lussac's law

d. Dalton's Law

11. A hot air balloon is a demonstration of which of the following gas laws?

Name(s): _____

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- a. **Charles Law**
- b. Boyle's Law
- c. Gay Lussac's law
- d. Dalton's Law

$$1. P_1 V_1 = P_2 V_2$$

$$1.10 \times 6.20 = 0.925 \times V_2$$

$$V_2 = \frac{1.10 \times 6.20}{0.925}$$

$$V_2 =$$

$$2. P_1 V_1 = P_2 V_2$$

$$P_2 = \frac{P_1 V_1}{V_2} = \frac{1 \times 20}{10}$$

$$P_2 = 2.0 \text{ atm}$$

$$3. \frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{2.3}{273.15} = \frac{P_2}{310.15}$$

$$P_2 = \frac{2.3 \times 310.15}{273.15}$$

$$= 2.612 \text{ atm}$$

$$4. T_1 = 273.15 + 27 = 300.15$$

$$P_1 = 1 \text{ atm}$$

$$V_1 = 1$$

$$T_2 = ?$$

$$V_2 = 1 \times 2 = 2$$

$$P_2 = \frac{1}{2} = 0.5$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$T_2 = \frac{0.5 \times 2 \times 300.15}{1 \times 1}$$

$$T_2 = 300.15 \text{ K}$$

$$T_{in} ^\circ\text{C} = 300.15 - 273.15$$

$$= 27^\circ\text{C}$$

$$5. \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{26.4 \times 2.5}{275.65} = \frac{P_2 \times 36.2}{283.15}$$

$$P_2 = \frac{283.15 \times 26.4 \times 2.5}{275.65 \times 36.2}$$

$$P_2 = 1.873 \text{ atm}$$

$$6. P_r = nRT$$

$$n = \frac{PV}{RT}$$

$$n = \frac{1.33 \times 50.3}{8.314 \times 350.15}$$

$$n = \underline{0.023 \text{ moles}}$$

$$(L) \text{ Mass} = \text{Moles} \times R.M.M$$

$$0.2437 \times 32$$

$$= \underline{7.7984g}$$

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$$n = \frac{PV}{RT}$$

$$P = 3 \text{ atm}$$

$$V = 200L$$

$$R = 8.314$$

$$T = (273.15 + 23) = \overset{296.15}{\cancel{300.15}}$$

$$n = \frac{3 \times 200}{8.314 \times 296.15}$$

$$n = \underline{0.2437 \text{ moles}}$$