Unit 8: Properties of Gases

Vocabulary

Use your textbook to define the following terms

- Barometer
- Pressure
- Temperature
- Volume
- Ideal gas constant

Web Quest

On the upper left corner of the chemistry web page is a link called ***Gas Laws Web Quest***. Use this links there to fill in the following information about gasses

First link: Properties of Gases (use headphones if you have them)

⇒ Describe the setup of the apparatus:

⇒ Increase the pressure at constant temperature. What happens to the volume of the container?

⇒ Increase the temperature at constant volume. What happens to the speed of the molecules? What happens to the pressure? (measured in atm, initially starts at 1 atm)

⇒ Increase the temperature at constant pressure. What happens to the volume?

⇒ Increase the number of gas particles. What happens to the volume?

From the information above, answer the following questions/statements:

⇒ When pressure increases, volume _____; when pressure decreases, volume _____.

⇒ When temperature increases, pressure _____; when temp. decreases, pressure _____.

⇒ When temperature increases, volume _____; when temp. decreases, volume _____.

Second Link: Boyle's Law Graphing

Pick 10 different volumes by dragging the plunger, then click "graph." Sketch the graph below, labeling axes.

What happens to the pressure when you decrease the volume?

_____

Third Link: Charles' Law

Try decreasing the temperature a few times. What happens to the volume?

_____

Try increasing the temperature a few times. What happens to the volume?

_____

When volume decreases, temperature _____.

Fourth Link: Boyle's and Gay-Lussac's Law

Click on "Robert Boyle." State Boyle's Law:

In other words, when pressure increases, volume _____.

Click on "Joseph Louis Gay-Lussac." What did he conclude, which is similar to Charles' Law?

Combined Gas Law Problems

1. If I initially have a gas at a pressure of 12 atm, a volume of 23 liters, and a temperature of 200 K, and then I raise the pressure to 14 atm and increase the temperature to 300 K, what is the new volume of the gas?
2. A gas takes up a volume of 17 liters, has a pressure of 2.3 atm, and a temperature of 299 K. If I raise the temperature to 350 K and lower the pressure to 1.5 atm, what is the new volume of the gas?
3. I have an unknown volume of gas at a pressure of 0.5 atm and a temperature of 325 K. If I raise the pressure to 1.2 atm, decrease the temperature to 320 K, and measure the final volume to be 48 liters, what was the initial volume of the gas?
4. If I have 21 liters of gas held at a pressure of 78 atm and a temperature of 900 K, what will be the volume of the gas if I decrease the pressure to 45 atm and decrease the temperature to 750K?
5. I have an unknown volume of gas held at a temperature of 115 K in a container with a pressure of 60 atm. If by increasing the temperature to 225 K and decreasing the pressure to 30 atm causes the volume of the gas to be 29 liters, how many liters of gas did I start with?

Ideal Gas Law Problems

1. If I have 4 moles of a gas at a pressure of 5.6 atm and a volume of 12 liters, what is the temperature?
2. If I contain 3 moles of gas in a container with a volume of 60 liters and at a temperature of 400 K, what is the pressure inside the container?
3. If I have an unknown quantity of gas at a pressure of 0.5 atm, a volume of 25 liters, and a temperature of 300 K, how many moles of gas do I have?
4. If I have 21 moles of gas held at a pressure of 78 atm and a temperature of 900 K, what is the volume of the gas?
5. If I have an unknown quantity of gas held at a temperature of 1195 K in a container with a volume of 25 liters and a pressure of 560 atm, how many moles of gas do I have?
6. How many moles of gas are contained in 0.890 L at 294 K and 1 atm pressure?
7. How many moles of a gas are present in a 5 L container kept at STP?
8. 2 mol of H_2 is contained in a 2.00 L container at 293 K. What is the pressure in this container?