Name _____

The Gas Laws

1. The gas left in a used aerosol can is at a pressure of 1 atm at 27°C. If this can is thrown into a fire, what is the internal pressure of the gas when its temperature reaches 927°C?

GIVEN	GAS LAW	WORK
	FORMULA	
ANSWER:		

2. A sample of carbon dioxide occupies a volume of 3.50 L at 125 kPa. What pressure would the gas exert if the volume were decreased to 2.00 L?

GIVEN	GAS LAW	WORK
	FORMULA	
ANSWER:		

3. A sample of propane occupies 250.0 L at 125 kPa and 38°C. Find its volume at 100.0 kPa and 95°C.

GIVEN	GAS LAW	WORK
	FORMULA	
ANSWER:		

4. Oxygen gas is at a temperature of 40°C when it occupies a volume of 2.3 L. To what temperature **in Celsius** should it be raised to occupy a volume of 6.5 dm³?

GIVEN	GAS LAW		WORK
	FORMULA		
ANSWER:			

5. Fluorine exerts a pressure of 90.0. kPa. When the pressure is changed to 150. kPa, its volume is 250. mL. What was the original volume?

GIVEN	GAS LAW		WORK
	FORMULA		
ANSWER:			

6. The volume of a gas is 200.0 mL at 275 K and 92.1 kPa. Find its volume at STP.

GIVEN	GAS LAW		WORK
	FORMULA		
ANSWER:			

7. A sample of N_2 occupies a volume of 250 mL at 25°C. What volume will it occupy at 95°C?

GIVEN	GAS LAW		WORK
	FORMULA		
ANSWER:			

Gas Laws – Boyle's, Charles's, Gay-Lussac's, and Combined

Boyle's Law

1. A sample of oxygen gas occupies a volume of 250 mL at 740 torr. What volume will it occupy at 800 torr if the temperature is held constant?

2. A 2.0 liter container of nitrogen had a pressure of 3.2 atm. What volume would be necessary to decrease the pressure to 1.0 atm if the temperature is held constant?

3. Chlorine gas occupies a volume of 1.2 liters at 720 torr. What volume will it occupy at 1 atm pressure?

4. Fluorine gas exerts a pressure of 900 torr. When the pressure is changed to 152 kPa, its volume is 250 mL. What was the original volume?

Charles's Law

5. A sample of nitrogen occupies a volume of 250 mL at 25°C. What volume will it occupy at 95°C if the pressure of the gas is held constant?

6. Chlorine gas occupies a volume of 25 mL at 300 K. What is the new temperature of the gas if the volume changes to 50 mL and the pressure of the gas remains the same?

7. A sample of argon gas is cooled and its volume went from 0.380 L to 250 mL. If its final temperature was -55°C, what was its original temperature?

8. Hydrogen gas was cooled from 150°C to 50°C. Its new volume is 75 mL. What was its original volume?

Gay-Lussac's Law

9. A gas held in a rigid container (constant volume) has a pressure of 4.0 atm at 100°C. To what temperature would you have to heat to gas to get the pressure to reach 9.5 atm?

10. When a gas is heated to 90°C, it exerts a pressure of 350 kPa on its 5-liter container. If the temperature is decreased to 50°C, what is the new pressure exerted on the container?

Combined Gas Law
11. A gas at a pressure of 1.5 atm occupies 3.0 L at 20°C. If the pressure is increased to 2.5 atm and the temperature is increased to 30°C, find the new volume.

12. A gas at unknown pressure occupies 750 mL at 0°C. When this gas occupies 0.5 L at 25°C, it has a pressure of 2.0 atm. Find the original pressure.

13. The pressure of a gas at 22°C is 600 mmHg when it occupies 2.5 L. If the gas is compressed to 1.8 L and the pressure changes to 760 mmHg, what is its new temperature <u>in Celsius</u>?

14. A gas at a temperature of 100°C has a pressure of 650 torr. When the temperature of the gas is increased to 150°C and the pressure of the gas changes to 1.2 atm, the gas occupies 225 mL. Find the original volume of the gas.

Mixed Problems
15. Fluorine gas at 300 K occupies a volume of 500 mL. To what temperature should it be lowered to bring the volume to 300 mL?

16. Ammonia gas occupies a volume of 450 mL at a pressure of 720 mmHg. What volume will it occupy at standard pressure?

17. Helium occupies a volume of 3.8 liters at -45°C. What will its temperature be if it occupies 5.3 L?

18. A gas has a pressure of 720 torr when it occupies 256 mL at 25°C. What is its new pressure at 50°C if it now has a volume of 250 mL?

19. The pressure of a gas is 5.6 atm when at 60°C. If the pressure is increased to 942 kPa, what is the new temperature of the gas?

Combined Gas Law Problems

Use the combined gas law to solve the following 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)   A gas that has a volume of 28 liters, a temperature of 45 ^{0}C, and an unknown pressure has its volume increased to 34 liters and its temperature decreased to 35 ^{0}C. If I measure the pressure after the change to be 2.0 atm, what was the original pressure of the gas?

4)   A gas has a temperature of 14 ^{0}C, and a volume of 4.5 liters. If the temperature is raised to 29 ^{0}C and the pressure is not changed, what is the new volume of the gas?

Ideal Gas Law Problems

Use the ideal gas law to solve the following 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 have an unknown quantity of gas at a pressure of 1.2 atm, a volume of 31 liters, and a temperature of 87 ^{0}C, how many moles of gas do I have?

3) 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?

4) If I have 7.7 moles of gas at a pressure of 0.09 atm and at a temperature of 56 ^{0}C, what is the volume of the container that the gas is in?

5) If I have 17 moles of gas at a temperature of 67 ^{0}C, and a volume of 88.89 liters, what is the pressure of the gas?

6) 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?