Combined Gas Law Problems

P, V, = P3 V2

Use the combined gas law to solve the following problems:

If I initially have a gas at a pressure of 12 atm, a volume of 23 liters, and a 1) temperature of 200 K, and then I raise the pressure to 14 atm and increase the temperature to $300 \, \text{K}$, what is the new volume of the gas?

(12atm)(23L) = (14atm)(Va) $V_2 = 29.6L$

A gas takes up a volume of 17 liters, has a pressure of 2.3 atm, and a 2) temperature of 299 Kulf I raise the temperature to 350 K and lower the pressure to 1.5 atm, what is the new volume of the gas?

 $\frac{(2.3atm)(17L)}{299K} = \frac{(1.5atm)(V_a)}{350.5L}$

A gas that has a volume of 28 liters, a temperature of 45 $^{\circ}$ C, and an 3) unknown pressure has its yolume increased to 34 liters and its temperature decreased to \$5 °C. If I measure the pressure after the change to be 2.0 atm, what was the original pressure of the gas?

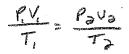
 $\frac{(P_1)(.28L)}{318.15K} = \frac{(2.04m)(34L)}{308.15K}$ $\frac{(P_1)(.28L)}{308.15K} = \frac{(2.04m)(34L)}{308.15K}$

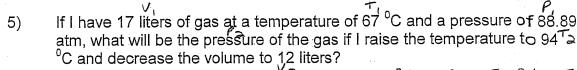
A gas has a temperature of 14 °C, and a volume of 4.5 liters. If the temperature is raised to 29 °C and the pressure is not changed, what is 4) the new volume of the gas?

Ty = 29°C+273.15 = 287.15K

$$\frac{V_1}{T_1} = \frac{V_2}{T_3}$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_3} \qquad \frac{4.5L}{287.15K} = \frac{V_3}{302.15K} \qquad \boxed{V_2 = 4.74L}$$





OC and decrease the volume to 12 liters?
$$\frac{(88.89atm)(17L)}{340.15 \, \text{K}} = \frac{(P_0)(12L)}{340.15 \, \text{K}}$$

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$$\frac{(0.5atm)(V_1)}{325 K} = \frac{(1.2atm)(48L)}{325 K}$$

$$V_1 = 117L$$

7) If I have 21 liters of gas held at a pressure of 78 atm and a temperature of 7, 900 K, what will be the volume of the gas if I decrease the pressure to 45 atm and decrease the temperature to 750 K?

8) If I have 2.9 L of gas at a pressure of 5 atm and a temperature of 50 °C, what will be the temperature of the gas if I decrease the volume of the gas to 2.4 L and decrease the pressure to 3 atm?

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$$\frac{(5_{atm})(2.9L)}{323.15K} = \frac{(3_{atm})(2.4L)}{T_{a}} = \frac{7}{1200}$$

9) 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 1225 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?