

Charles Law Worksheet

1. Give the temperature-volume law both in words and in the form of an equation.
2. How is the volume of a gas affected by a decrease in temperature?
3. What would be the new volume if the temperature on 450 mL of gas is changed from 45°C to -5°C?
4. A sample of gas, whose volume at 27°C is 0.127 L, is heated at constant pressure until its volume becomes 317 mL. What is the final temperature of the gas in Celsius and kelvin?
5. To make 300 mL of oxygen at 20.0°C change its volume to 250 mL, what must be done to the sample if its pressure and mass are to be held constant?
6. To what temperature must an ideal gas at 27°C be cooled to reduce its volume by 1/3?
7. From the data in the following questions calculate the missing quantity.
 - a) $V_1 = 22.4 \text{ L}$; $T_1 = 0^\circ\text{C}$; $T_2 = 91^\circ\text{C}$; $V_2 = ? \text{ L}$
 - b) $V_1 = 125 \text{ mL}$; $T_1 = ?$; $T_2 = 25^\circ\text{C}$; $V_2 = 100 \text{ mL}$
 - c) $V_1 = ? \text{ L}$; $T_1 = 400 \text{ K}$; $T_2 = 175 \text{ K}$; $V_2 = 6.20 \text{ L}$
 - d) $V_1 = 250 \text{ mL}$; $T_1 = 298 \text{ K}$; $T_2 = ? \text{ K}$; $V_2 = 273 \text{ mL}$
8. A 50 cm^3 sample of a gas in a syringe at 15°C is heated to 50°C and the syringe's piston is allowed to move outward against a constant atmospheric pressure. Calculate the new volume of the hot gas.
9. What is the final volume if 3.4 L of nitrogen gas at 400 K is cooled to 200 K and kept at the same pressure?
10. Determine the final volume of 20 L of a gas whose temperature changes from -73°C to 327°C if the pressure remains constant.
11. A partially filled plastic balloon contains $3.4 \times 10^3 \text{ m}^3$ of helium gas at 5°C. The noon day sun heats this gas to 37°C. What is the volume of the balloon if atmospheric pressure remains constant?