

CHEMISTRY PROBLEM SET 10-2 CHARLES' LAW

Key

NAME

Temp °C	Temp °K
0	273°K
-223°C	50
100	373°K
0°C	273
25	298°K
27°C	300

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

1. If a gas has a volume of 25.6 ml at 25°C what will its volume be at 53°C.?

$$\frac{25.6 \text{ ml}}{298^\circ\text{K}} = \frac{V_2}{326^\circ\text{K}} \quad V_2 = \frac{25.6 \text{ ml} (326^\circ\text{K})}{298^\circ\text{K}} = 28 \text{ mL}$$

2. If the pressure of a gas is 600 mm at 30°C, what is the pressure at 65°C?

$$\frac{600 \text{ mm}}{303^\circ\text{K}} = \frac{P_2}{338^\circ\text{K}} \quad P_2 = \frac{600 \text{ mm} (338^\circ\text{K})}{303^\circ\text{K}} = 669 \text{ mm Hg}$$

3. A balloon bursts when its volume exceeds 692 ml. If the balloon has a volume of 500 ml at 0°C, what is the highest temperature it can reach before bursting?

$$\frac{500 \text{ ml}}{273^\circ\text{K}} = \frac{692 \text{ ml}}{T_2} \quad T_2 (500 \text{ ml}) = \frac{692 \text{ ml} (273^\circ\text{K})}{500 \text{ ml}} \quad T_2 = \frac{692 \text{ ml} (273^\circ\text{K})}{500 \text{ ml}}$$

$$377.8^\circ\text{K} - 273 = 105^\circ\text{C} \quad T_2 = 377.8^\circ\text{K}$$

4. A balloon has a volume of 40 ml. at 25°C. What temperature will cause the volume to double?

$$\frac{40 \text{ ml}}{298^\circ\text{K}} = \frac{80 \text{ ml}}{T_2} \quad T_2 (40 \text{ ml}) = \frac{80 \text{ ml} (298^\circ\text{K})}{40 \text{ ml}} = 596^\circ\text{K}$$

$$596^\circ\text{K} - 273 = 323^\circ\text{C}$$

5. The pressure in a tank is 1000 mm Hg at 25°C. What temperature will cause the pressure to become 1500 mm Hg ?

$$\frac{1000 \text{ mm Hg}}{298^\circ\text{K}} = \frac{1500 \text{ mm Hg}}{T_2} \quad T_2 (1000 \text{ mm}) = \frac{1500 \text{ mm} (298^\circ\text{K})}{1000 \text{ mm}}$$

$$T_2 = 447^\circ\text{K} - 273 = 174^\circ\text{C}$$

6. A Glass tube contains oxygen gas at a pressure of 489 mm Hg. And a temperature of 37°C.

At what temperature will the tube contain gas at a pressure of 245 mm Hg ?

$$\frac{489 \text{ mm}}{310^\circ\text{K}} = \frac{245 \text{ mm}}{T_2} \quad T_2 (489 \text{ mm}) = \frac{245 \text{ mm} (310^\circ\text{K})}{489 \text{ mm}}$$

$$T_2 = 155^\circ\text{K} - 273 = -118^\circ\text{C}$$

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1. If a gas has a volume of 25.6 ml at 25°C what will its volume be at 53°C.?
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4. A balloon has a volume of 40 ml. at 25°C. What temperature will cause the volume to double?
5. The pressure in a tank is 1000 mm Hg at 25°C. What temperature will cause the pressure to become 1500 mm Hg ?
6. A Glass tube contains oxygen gas at a pressure of 489 mm Hg. And a temperature of 37°C.
At what temperature will the tube contain gas at a pressure of 245 mm Hg ?