

**Example(4):** At 27°C and 750 mmHg, a gas occupies 380 cm<sup>3</sup>. What is the volume of this gas at STP?

**Solution:** :

**Initial state**

$$P_1 = 750 \text{ mmHg}$$

$$T_1 = 27^\circ\text{C} + 273 = 300 \text{ K}$$

$$V_1 = 380 \text{ cm}^3$$

**Final state(STP)**

$$P_2 = 760 \text{ mmHg}$$

$$T_2 = 273 \text{ K}$$

$$V_2 = ?$$

Using combined Gas Law,  $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$$V_2 = \frac{P_1 V_1 T_2}{T_1 P_2} = \frac{750 \text{ mmHg} \times 380 \text{ cm}^3 \times 273 \text{ K}}{300 \text{ K} \times 760 \text{ mmHg}} = 341.3 \text{ cm}^3$$

**Check:** The volume will decrease by decreasing temperature as well as by increasing pressure. So, answer is reasonable.