

Example(6): Calculate the volume of a 0.4 mol of a gas in a container at 265 K and 0.9 atm.

$$(R = 0.0821 \text{ L atm K}^{-1}\text{mol}^{-1})$$

Solution: :

$$n = 0.4 \text{ mol}$$

$$T = 265 \text{ K}$$

$$P = 0.9 \text{ atm}$$

$$V = ?$$

Using ideal gas law, $PV = nRT$;

$$V = \frac{nRT}{P}$$

$$V = \frac{0.4 \text{ mol} \times 0.0821 \text{ L atm K}^{-1}\text{mol}^{-1} \times 265 \text{ K}}{0.9 \text{ atm}} = 9.7 \text{ L}$$

Check: The given conditions of temperature and pressure are close to STP. Thus 0.4 mol of gas may occupy approximately 10 L.