

Answer on the question #42753, Chemistry, Physical Chemistry

Question:

A sample of nitrogen occupies a volume of 275 mL at 25 °C. What volume will it occupy at 85 °C?

Solution:

According to the ideal gas law:

$$pV = nRT$$

At the first state:

$$pV_1 = nRT_1$$

Respectively, at the second state:

$$pV_2 = nRT_2$$

When we divide one equation to another, we get:

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

Then, we can get the volume in the second state:

$$V_2 = \frac{V_1 T_2}{T_1} = \frac{275 \cdot 358.15}{298.15} = 330.3 \text{ mL}$$

Answer: 330.3 mL