Answer on Question #63834 - Chemistry – General Chemistry

What is the temperature in K of 45.0 g of N_2 gas at 7.30 ATM contained in a 250 mL vessel

Solution.

$p \times V = n \times R \times T$

$R = 8.31$ J/(mol·K)

$p = 7.30$ ATM = $(7.30 \times 101\ 325)$ Па = 7.4×10^5 Па

$V = 250$ mL = 0.25 L = 0.25×10^{-3} m³ = 25×10^{-5} m³

$n = m/M = 45.0/28 = 1.61$ mol

$7.4 \times 10^5 \times 25 \times 10^{-5} = 1.61 \times 8.31 \times T$

$T = 13.8$ K

Answer: $T = 13.8$ K