

Answer on Question #64319 - Chemistry - Physical Chemistry

Question

Calculate the work done by the system when 6 moles of an ideal gas at 25°C is allowed to expand isothermally and reversibly from an initial volume of 5 dm³ to final volume of 15 dm³

Solution:

$$\begin{aligned} W &= \int_{V_1}^{V_2} P dV = \int_{V_1}^{V_2} \frac{\nu RT}{V} dV = \nu RT \cdot \ln(V) \Big|_{V_1}^{V_2} = \nu RT \ln\left(\frac{V_2}{V_1}\right) = 6 \cdot 8.314 \cdot 298 \cdot \ln\frac{15}{5} \\ &= \mathbf{16331 \text{ (J)}} = \mathbf{16.3 \text{ (kJ)}} \end{aligned}$$

Answer: Work done by the system is **16.3 kJ**

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