

Answer on Question 56650, Physics, Molecular Physics | Thermodynamics

Question:

Air expands from 5 litres to 10 litres at 2 atm pressure. What is the external work done?

Solution:

By the definition of work done by a gas at constant pressure we have:

$$\begin{aligned}W &= \int_{V_1}^{V_2} PdV = P(V_2 - V_1) = 2 \cdot 1.013 \cdot 10^5 \frac{N}{m^2} \cdot (10 \cdot 10^{-3} m^3 - 5 \cdot 10^{-3} m^3) \\&= 2 \cdot 1.013 \cdot 10^5 \frac{N}{m^2} \cdot 5 \cdot 10^{-3} m^3 = 1.013 \cdot 10^3 J.\end{aligned}$$

Answer:

$$W = 1.013 \cdot 10^3 J.$$