

A perfect gas with a γ value of 1.4 undergoes an expansion process from a pressure of 600 kPa. The ratio of specific volumes v_2/v_1 is 3.0. Calculate the pressure p_2 at the end of the process if this is (i) polytropic with an index n of 1.26, (ii) isothermal, (iii) isentropic.

$$p_2 = p_1 \left(\frac{v_2}{v_1} \right)^{-n} = 600 \times 10^3 \times 3^{-1.26} = 150.3 \text{ kPa}$$

$$p_2 = p_1 \frac{v_1}{v_2} = 600 \times 10^3 \times \frac{1}{3} = 200 \text{ kPa}$$

$$p_2 = p_1 \left(\frac{v_2}{v_1} \right)^{-\gamma} = 600 \times 10^3 \times 3^{-1.4} = 128.9 \text{ kPa}$$