Answer on Question #46497, Physics, Molecular Physics

One end of a 30-cm long aluminium rod is exposed to a temperature of 500oC while the other end is maintained at 20oC. The rod has the diameter of 2.5 cm. If heat is conducted through the rod at the rate of 164.9 J/s, calculate the the thermal conductivity of aluminium

Solution

From the ideal gas law $PV = \frac{m}{\mu}RT$ for the density at the final state we obtain the **answer:**

$$\rho_2 = \frac{P_2\mu}{RT} = \frac{175 \cdot 10^3 pa \times 44 \cdot 10^{-3}\frac{kg}{mol}}{8.31\frac{J}{mol \cdot K} \times 313K} = 2.96\frac{kg}{m^3}$$