

A vacuum pump removes 15% of the air that is in a container at the beginning of a stroke. If m_r is the mass of air in the container after the r^{th} stroke:

- (i) express m_2 and m_3 in terms of the original mass m_0
- (ii) how many strokes are required to obtain 1% of the original mass?
- (iii) given that $m_2 = 7.225$ kg, determine

$$\sum_{r=0}^{\infty} m_r$$

The pressure, p , and volume, V , of a gas undergoing a polytropic process are related by the equation

$$p_1 V_1^n = p_2 V_2^n$$

where n is the polytropic index.

If
$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$$

determine an expression for p_1 , in terms of p_2 , T_1 , T_2 and n .