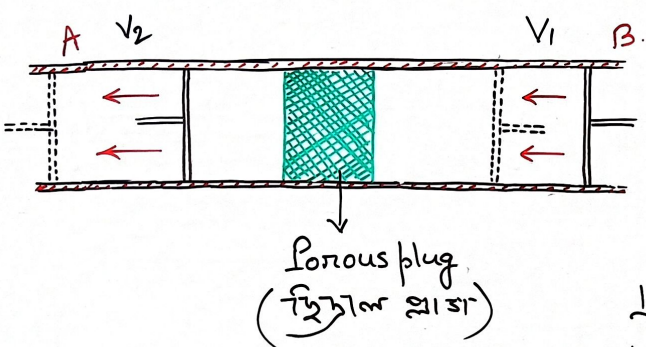


Joule-Thomson experiment.



AB tube is composed of insulated material.
So, heat exchange with surrounding is zero.

A porous plug is placed in middle portion of tube.

Pressure of gas at RHS ^{of plug} is P_1 & that of LHS is P_2 .

Let, V_1 volume gas is passed through porous plug

from RHS to LHS, so that the volume of gas expanded to V_2 ($V_2 > V_1$).
Joule-Thomson experiment showed that, due to this type of expansion temp. of maximum gases decreases automatically.

Exception:- H_2 , He gas

Q. Show that J-T experiment is an isoenthalpic process.

Ans. In J-T experiment pressure of gas changes from P_1 to P_2 & volume changes from V_1 to V_2 .

$$\therefore \text{Work done (W)} = (P_2 V_2 - P_1 V_1)$$

From 1st law of thermodynamics $dq = du + W \Rightarrow 0 = du + W$ [J-T expt. is an adiabatic process]
so, $dq = 0$.

$$\therefore 0 = du + P_2 V_2 - P_1 V_1$$

$$\Rightarrow 0 = (U_2 - U_1) + P_2 V_2 - P_1 V_1$$

$$\Rightarrow (U_1 + P_1 V_1) = (U_2 + P_2 V_2) \Rightarrow H_1 = H_2 \quad \text{Proved}$$