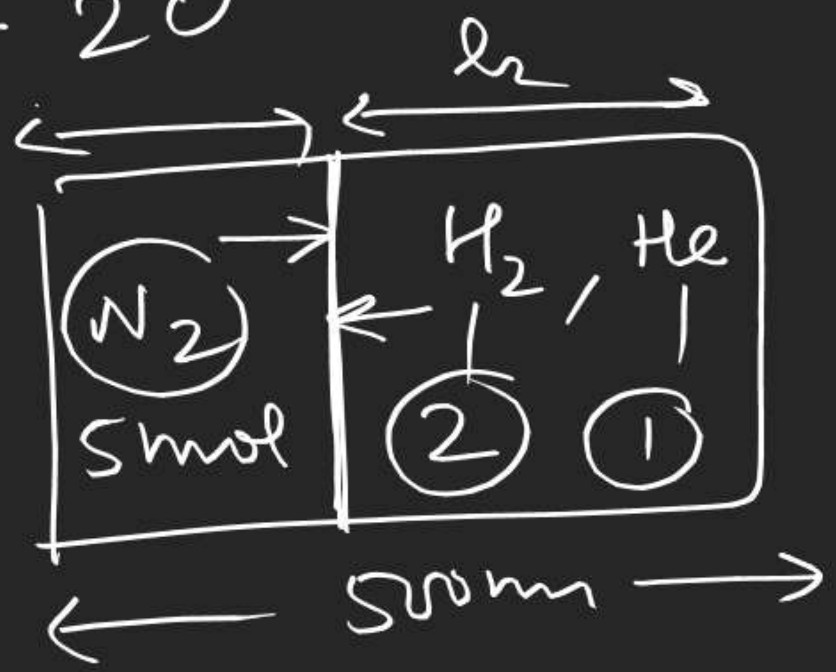
Nishant Jindal

Ideal Gas

20–22, 24

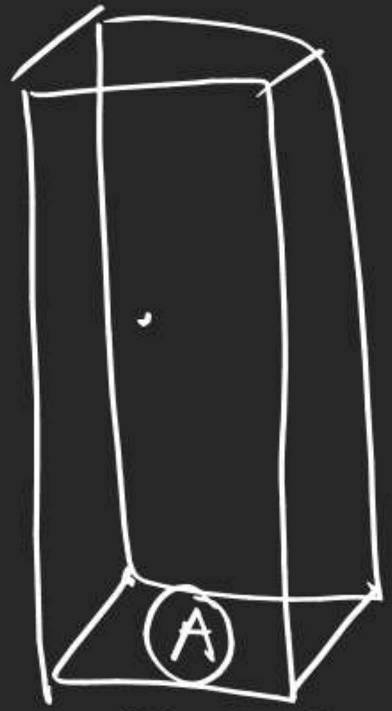
16–20

22



$$P_{N_2} = P_{H_2} + P_{He}$$

$$\frac{n_{N_2}\cancel{RT}}{\cancel{A}\times l_1} = \frac{n_{H_2}\cancel{RT}}{\cancel{A}\times l_2} + \frac{n_{He}\cancel{RT}}{\cancel{A}\times l_2}$$



A x height

$$\frac{n_{N_2}}{l_1} = \frac{n_{H_2}}{l_2} + \frac{n_{He}}{l_2}$$

$$\frac{5}{l_1} = \frac{3}{l_2}$$

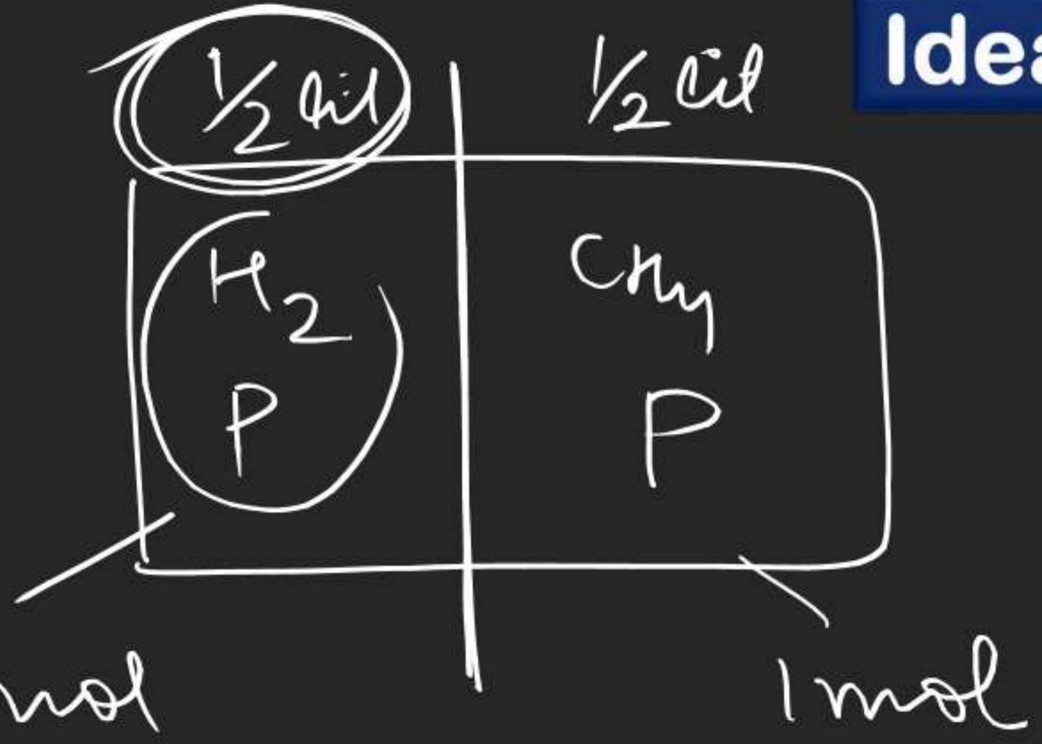
$$\boxed{\frac{l_1}{l_2} = \frac{5}{3}}$$

$$l_1 = \frac{5}{8} \times 500$$

$$l_2 = 3/8 \times 500$$

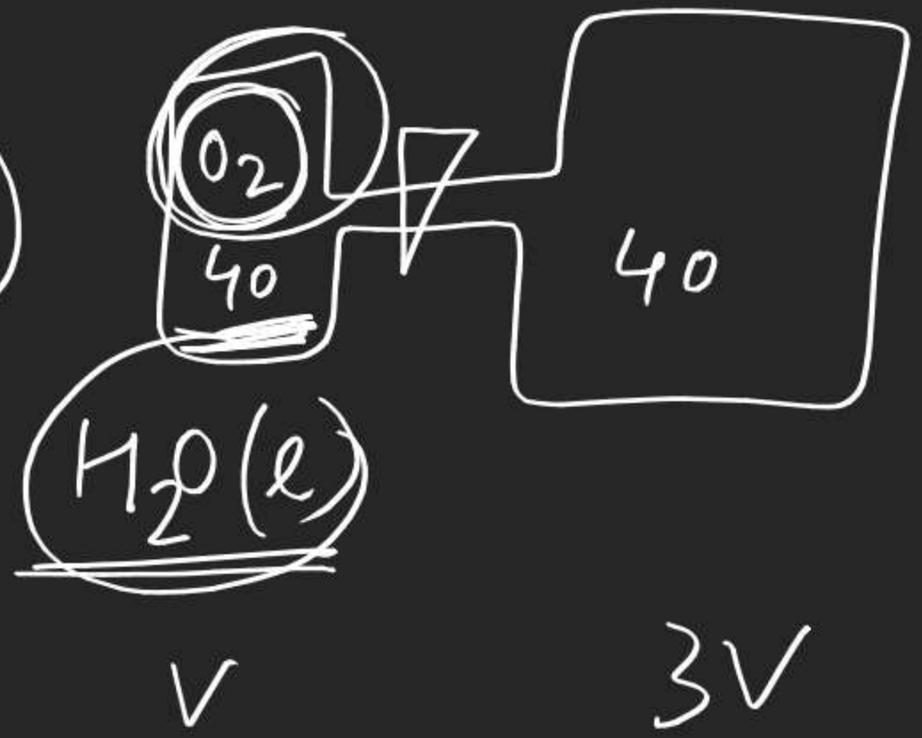
Ideal Gas

20



$P_{H_2} = P/2$ $\quad$ $P_{CH_4} = P/2$

24



840 mm

vap pr 40

800 mm

$800 \times V = P \times 4V$

$\boxed{200 = P}$

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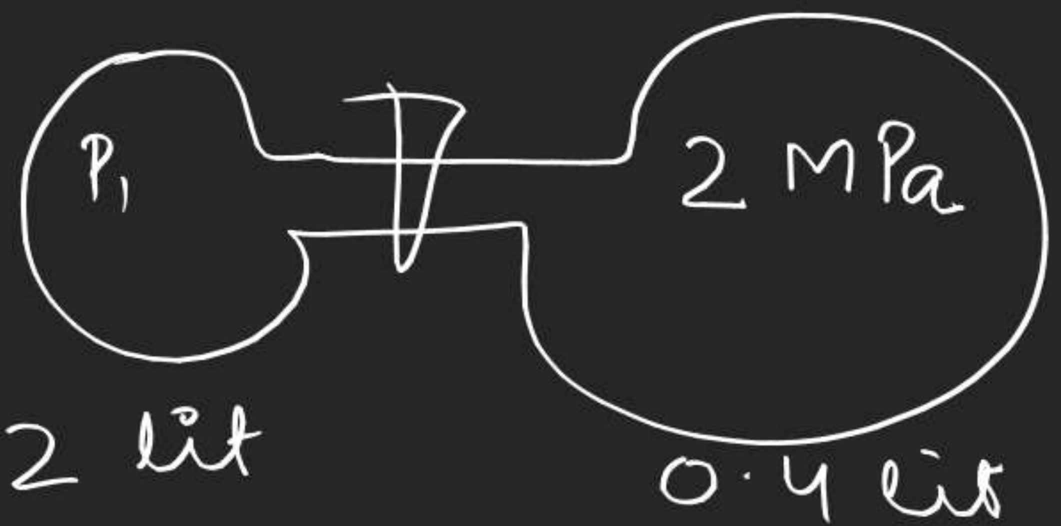
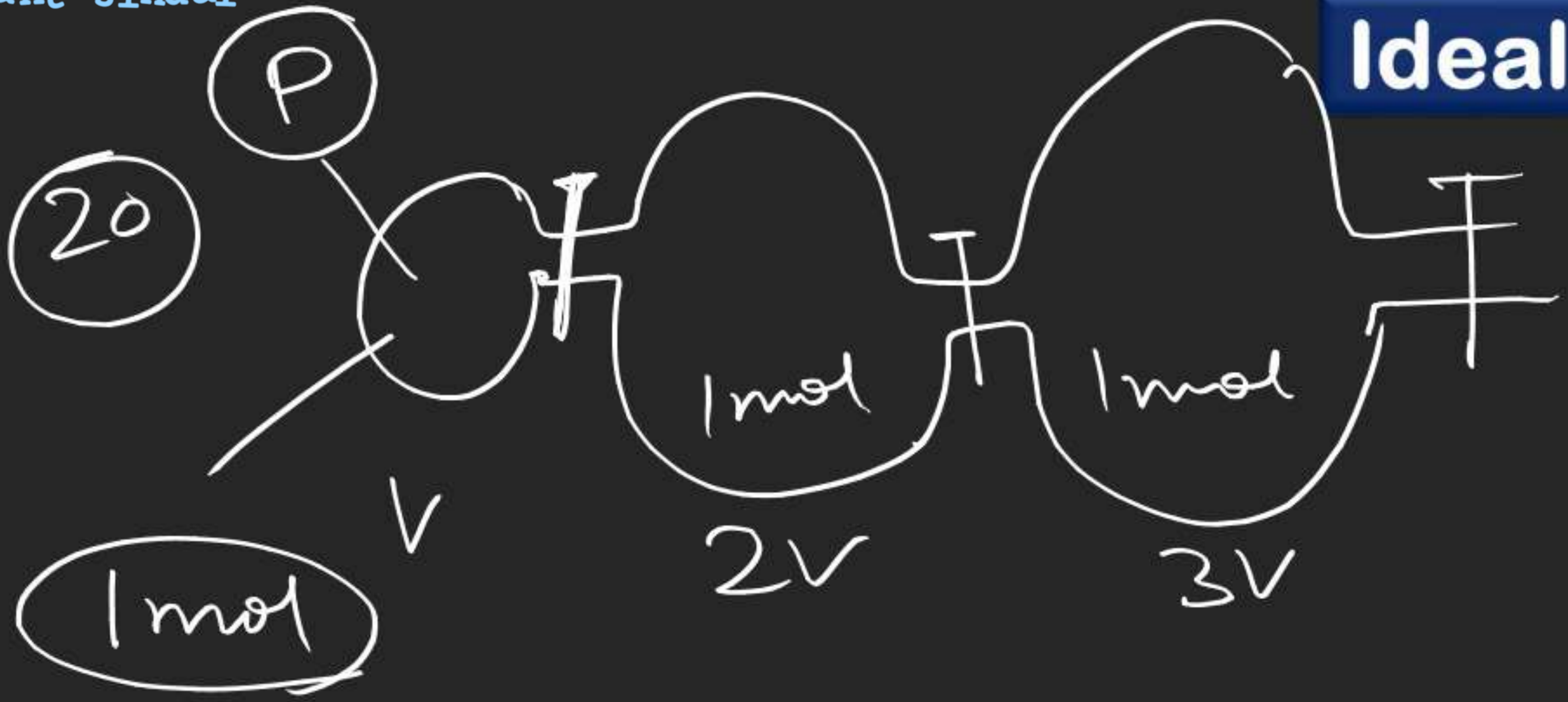
19)



$\frac{7}{6}$ MPa $= \frac{7}{6} \times 10^6$ Pa

$$P_1 \times 2 + 2 \times 0.4 = P_f \times 2.4$$

Ideal Gas



$$PV = RT$$

$$\frac{V}{RT} = \frac{1}{P}$$

$$P_f = \frac{2P}{n+1}$$

$$n = \frac{P_f V}{RT} + \frac{P_f (2V)}{RT} + \frac{P_f (3V)}{RT} \ldots$$

$$n = \frac{P_f V}{RT}(1+2+3 \ldots n)$$

$$P\cancel{n} = P_f \boxed{\frac{\cancel{n}(n+1)}{2}}$$

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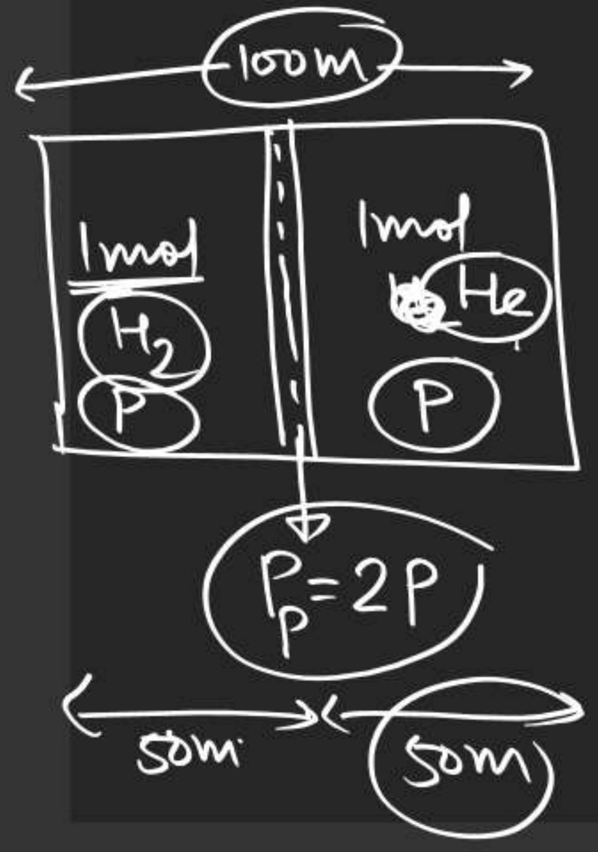
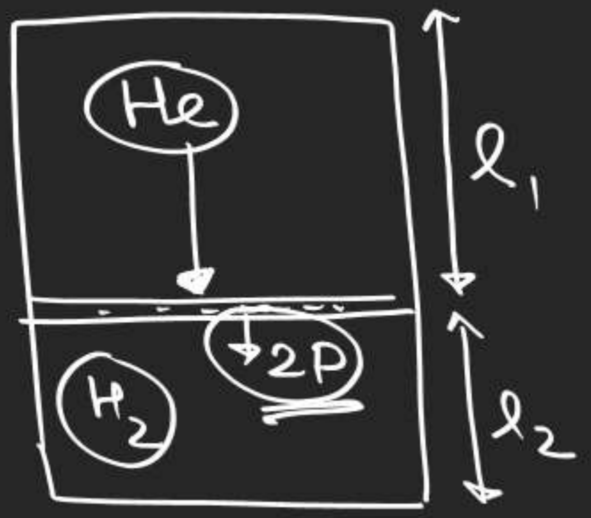
Q.





$$P_{He} + P_p = P_{H_2}$$
$$+2P$$

$$P \times 50 = P_{He} \times l_1$$
$$P \times 50 = P_{H_2} \times l_2$$

$$\frac{\cancel{P} \times 50}{l_1} + 2\cancel{P} = \frac{\cancel{P} \times 50}{l_2}$$

$$\frac{50}{l_1} + 2 = \frac{50}{100 - l_1}$$

$$2 = 50\left[\frac{1}{100-l_1} - \frac{1}{l_1}\right]$$

$$2 = 50\left[\frac{2l_1 - 100}{(100-l_1)l_1}\right]$$

$$(100 - l_1)l_1 = 25(2l_1 - 100)$$

$$100l_1 - l_1^2 = 50l_1 - 2500$$

$$l_1^2 - 50l_1 - 2500 = 0$$

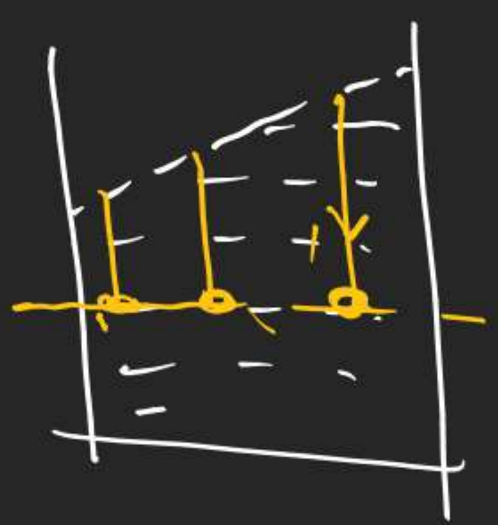
$$l_1 = \frac{+50 \pm \sqrt{2500 + 4 \times 2500}}{2}$$

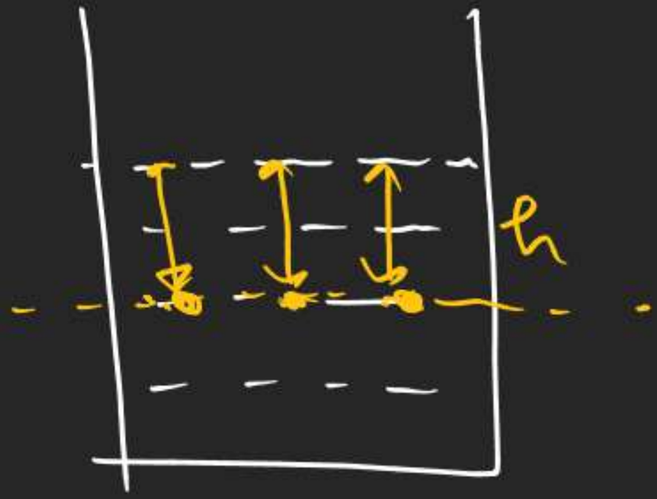
$$l = \frac{50 + 50\sqrt{5}}{2}$$

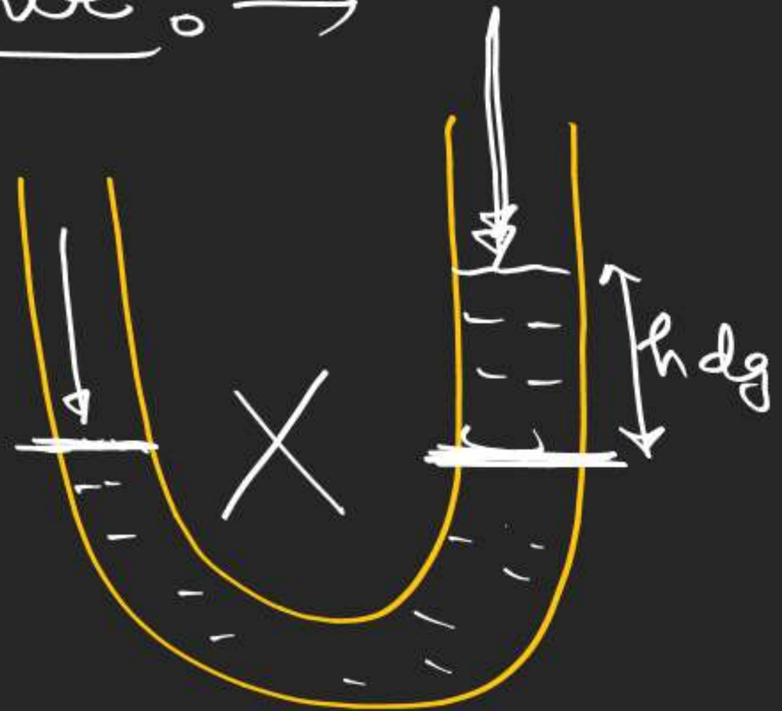
$$l_1 = 25(1 + \sqrt{5})$$

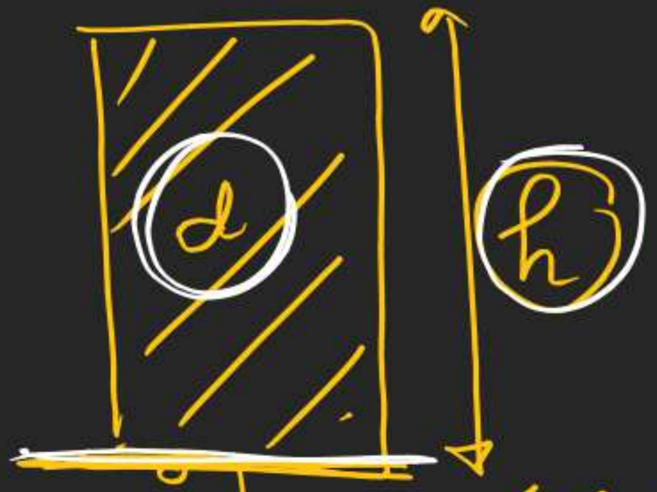
Ideal Gas

Problems with Mercury tube :→



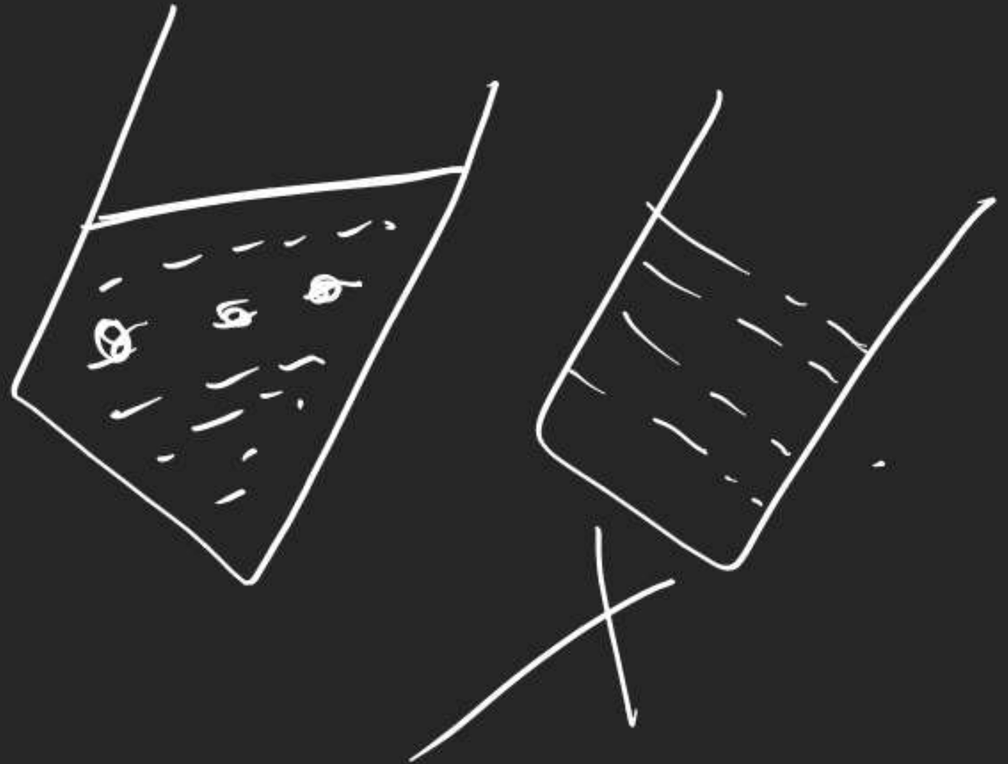






$$P = \frac{mg}{A} = \frac{(\cancel{A} \times h) d \times g}{\cancel{A}}$$

$$\boxed{= hdg}$$



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Ideal Gas

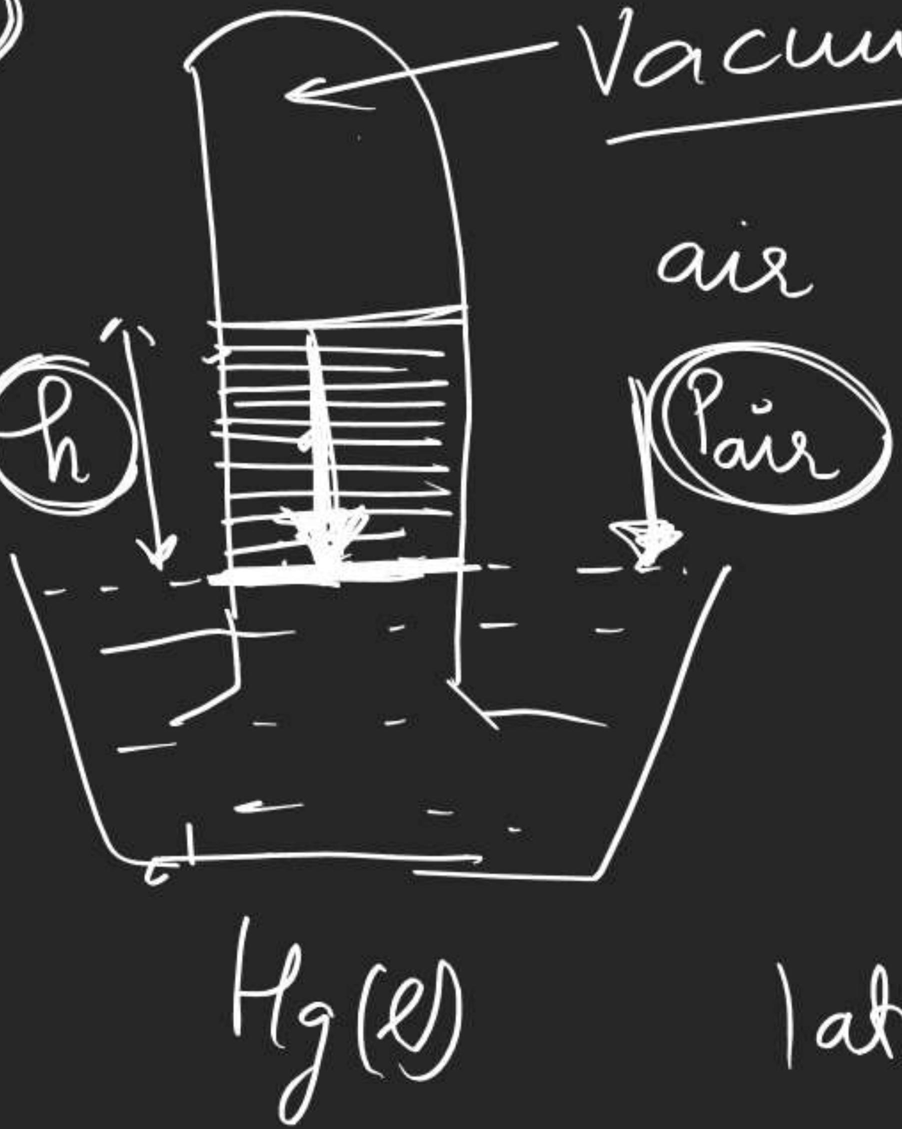
Barometer

density = 13.6 gm/ml

760mm = 76cm = h

0.76m

760mm of Hg



$$h d g = P_{air} = P_{atm}$$

$$0.76\,m \times 13.6\times10^3\,kg/m^3 \times 9.81\,m/sec^2 = P_{atm}$$

$$\boxed{1.01325\times10^5\,Pa = P_{atm}}$$

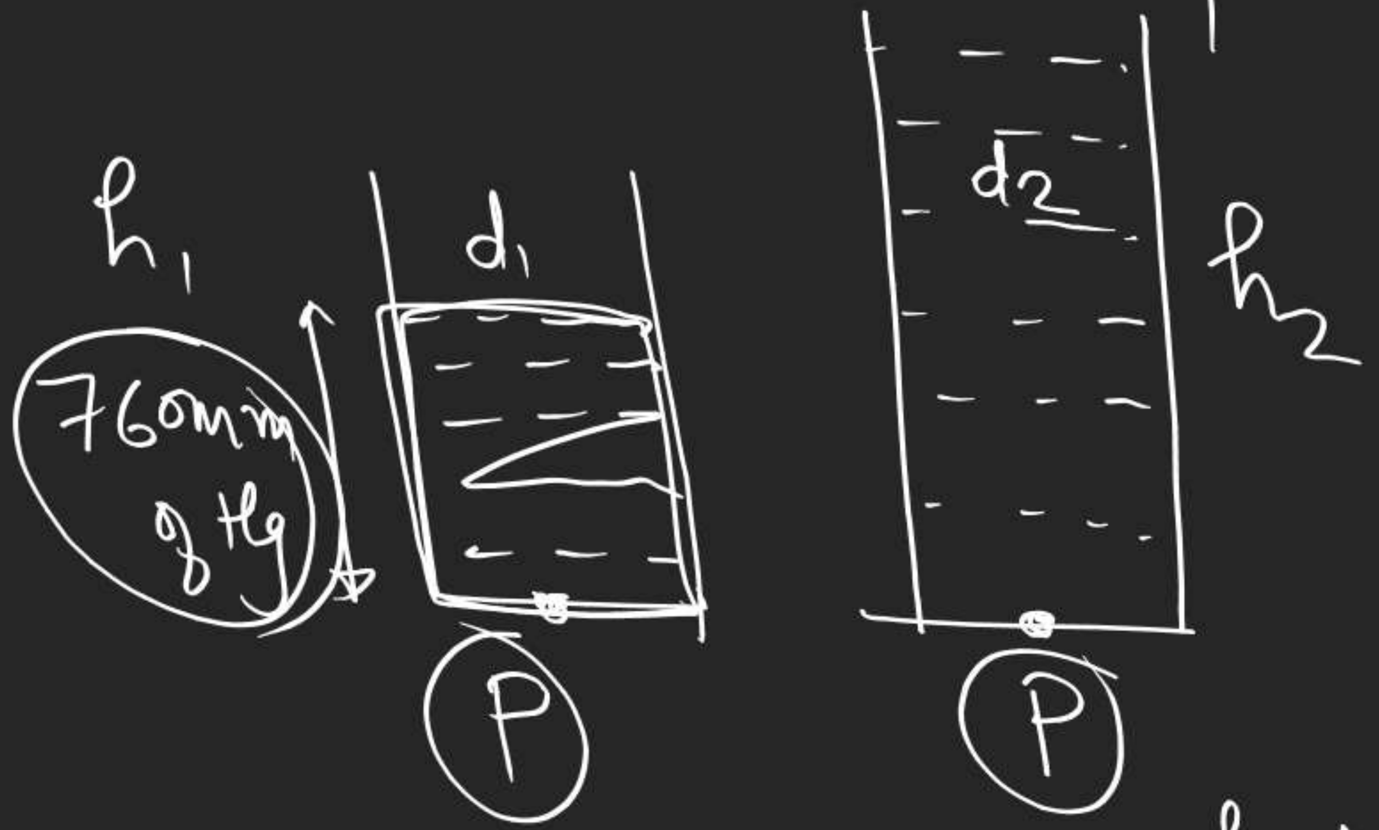
$= 1\,atm$

1 atm = 760 mm of Hg

= 760 torr

Ideal Gas

Q. Calculate the height of water column which will exert pressure equal to 1 atm or 760 mm of Hg



$P = h_1 d_1 g$ $\qquad$ $P = h_2 d_2 g$

$$\boxed{h_1 d_1 = h_2 d_2}$$

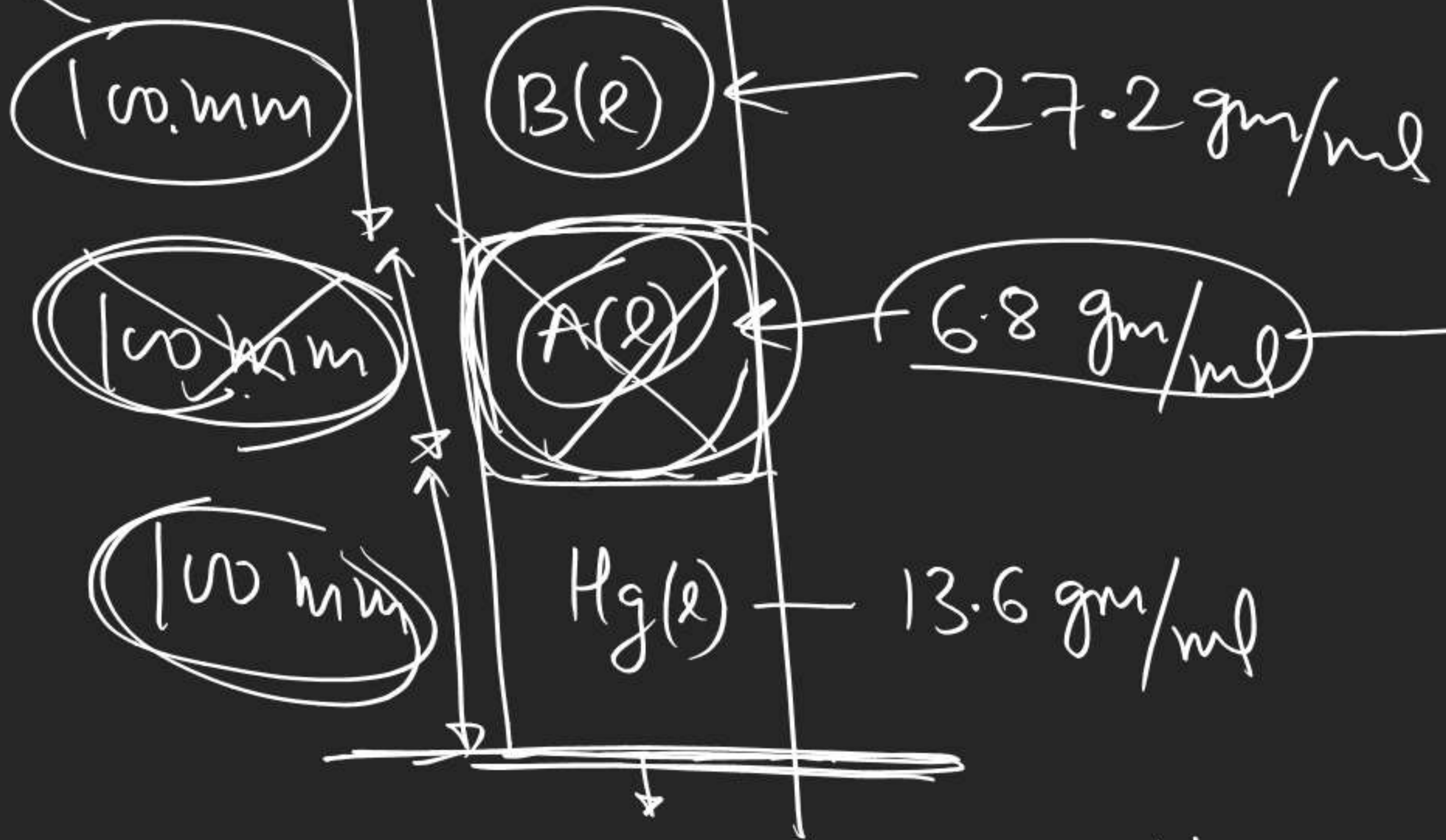
$$760\,mm \times 13.6\,gm/ml = h \times 1\,gm/ml$$

$$10336\,mm = h$$

$$10.336\,m \text{ of } H_2O = h$$

Ideal Gas

Q.) immiscible Liquid



P = ? in mm of Hg and atm

$$100 \times 27.2 = h \times 13.6$$
$$200\,mm = h$$

$$h_g d_g = 100 \times 6.8 = h \times 13.6$$
$$50\,mm = h$$

$$h_1 d_1 g + h_2 d_2 g + h_3 d_3 g = P_{Total}$$

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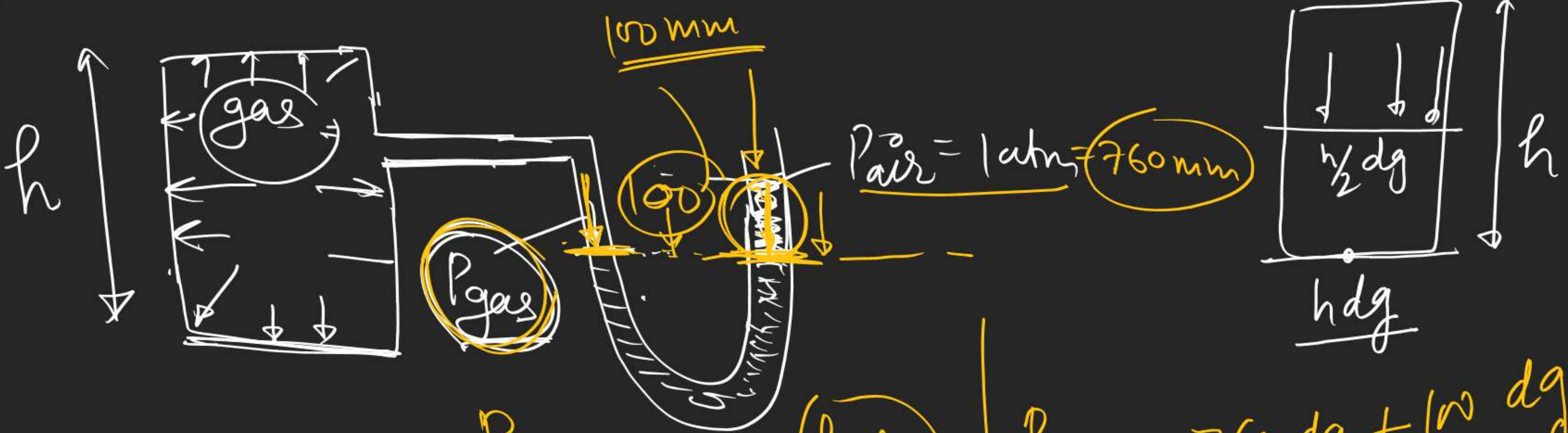
Ideal Gas

Manometer Used to measure the pressure of gas in a container.



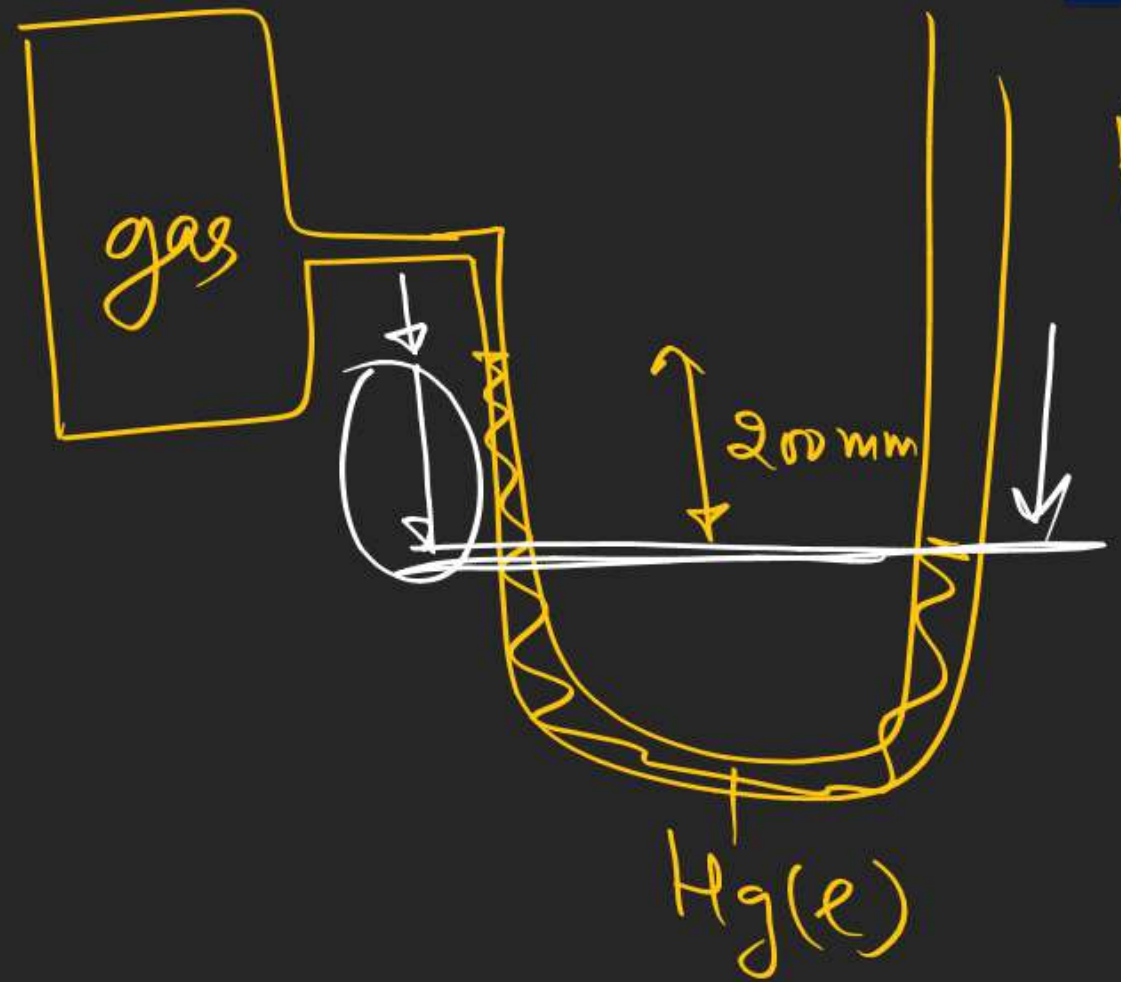
$P_{gas} = P_{air} + hdg$

$P_{gas} = 760\,dg + 100\,dg$

$= 860\,dg$

Ideal Gas

Q.



$P_{gas} = ?$

$P_{atm} = 760$ mm of Hg

$P_{gas} + 200 = P_{air}$

$P_{gas} + 200 = 760$

$\underline{P_{gas} = 560 \text{ mm of Hg}}$

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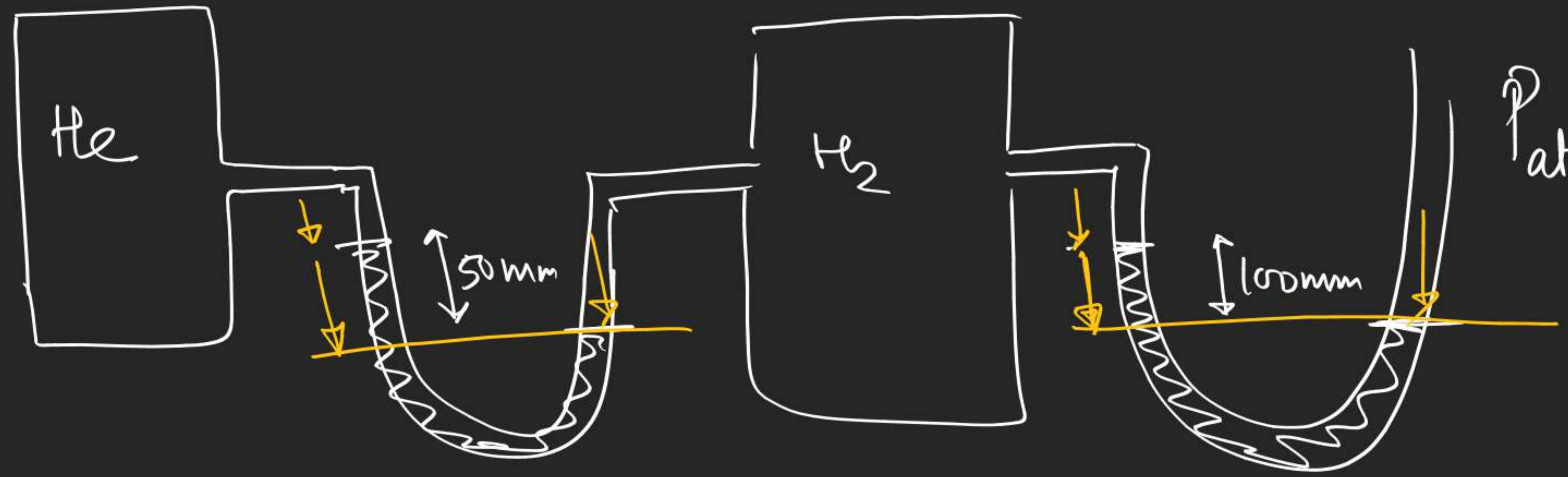
Ideal Gas

Q



$P_{atm} = 760$ mm

of Hg

$$P_{He} + 50 = P_{H_2}$$

$$P_{He} + 50 = 660$$

$$\underline{P_{He} = 610}$$

$$P_{H_2} + 100 = 760$$

$$P_{H_2} = 660$$

Nishant Jindal

Ideal Gas

0-I 16 — 19, 23

S-I 13 — 15, 21

0-II 1-3, 16 - 18

NSEC