Ideal Gas Equation

Course on States of Matter for Class XI

akhilesh • Lesson 1 • July 7, 2021

This chapter mainly deals with parameters/prop associated with gases.

General difference solid, liq, gas

Properties	Solid	liquid	Gases
Intermolecular force	very high	high	low
translational KE	very low	low	very high
Volume	fixed	fixed	not fixed
Shape	fixed	not fixed	not fixed.
Density	very high ⟷	high ⟷	low
Diffusion	very low	Moderate	very high

Parameters used to define a gas :→

1 dm = 0.1 m

(1) Mass / moles of gas

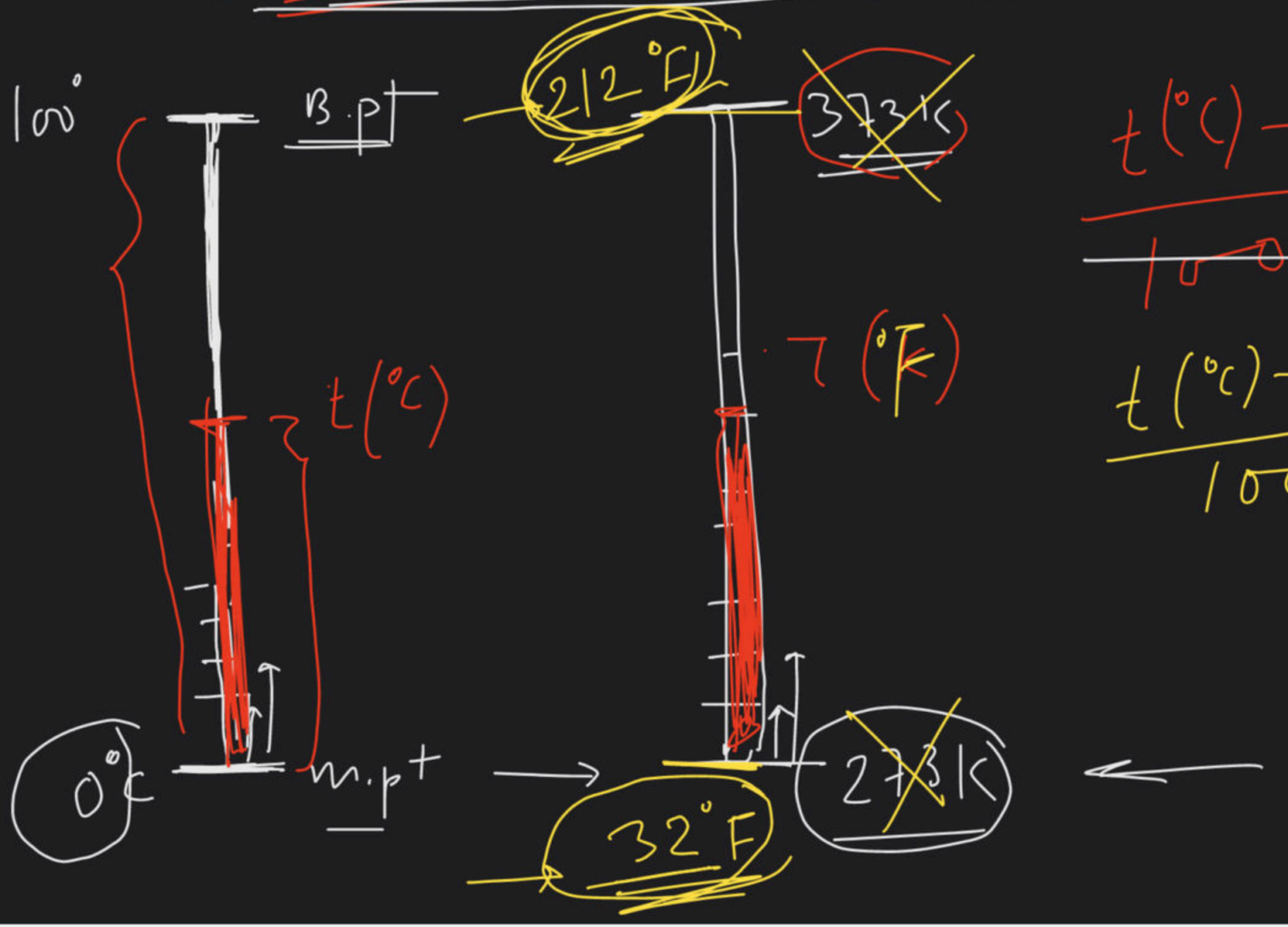
1 L = 1000 ml
= 1000 cc
= 1000 cm^3
= 1 dm^3
= 10^{-3} m^3

(2) Volume of gas = Vol of container

(3) Temperature :→

$T(K) = T(^\circ C) + 273.15$

$$\frac{9}{5}t(^\circ C) + 32 = T(^\circ F)$$

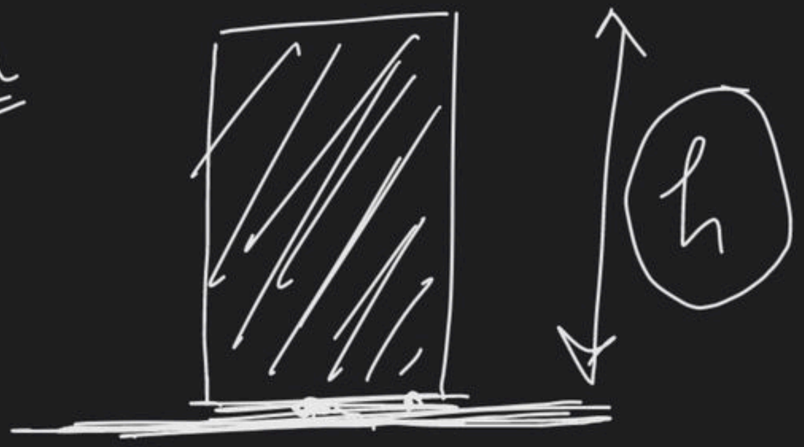


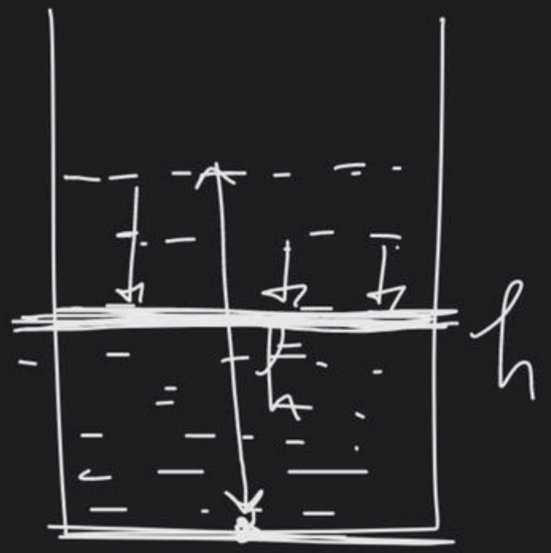
$$\frac{t(^\circ C) - 0}{100} = \frac{T(K) - 273}{100}$$

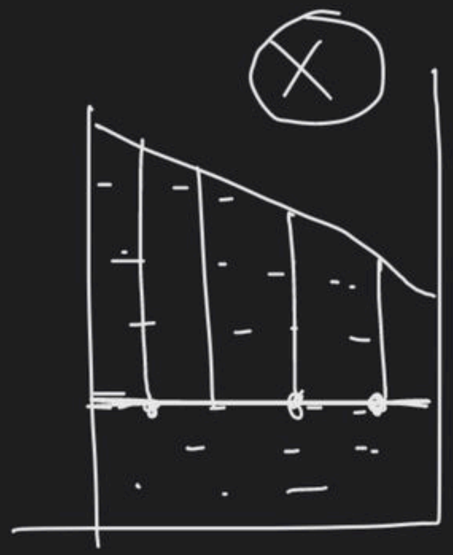
$$\frac{t(^\circ C) - 0}{100} = \frac{T(^\circ F) - 32}{180}$$

Pressure :→

d





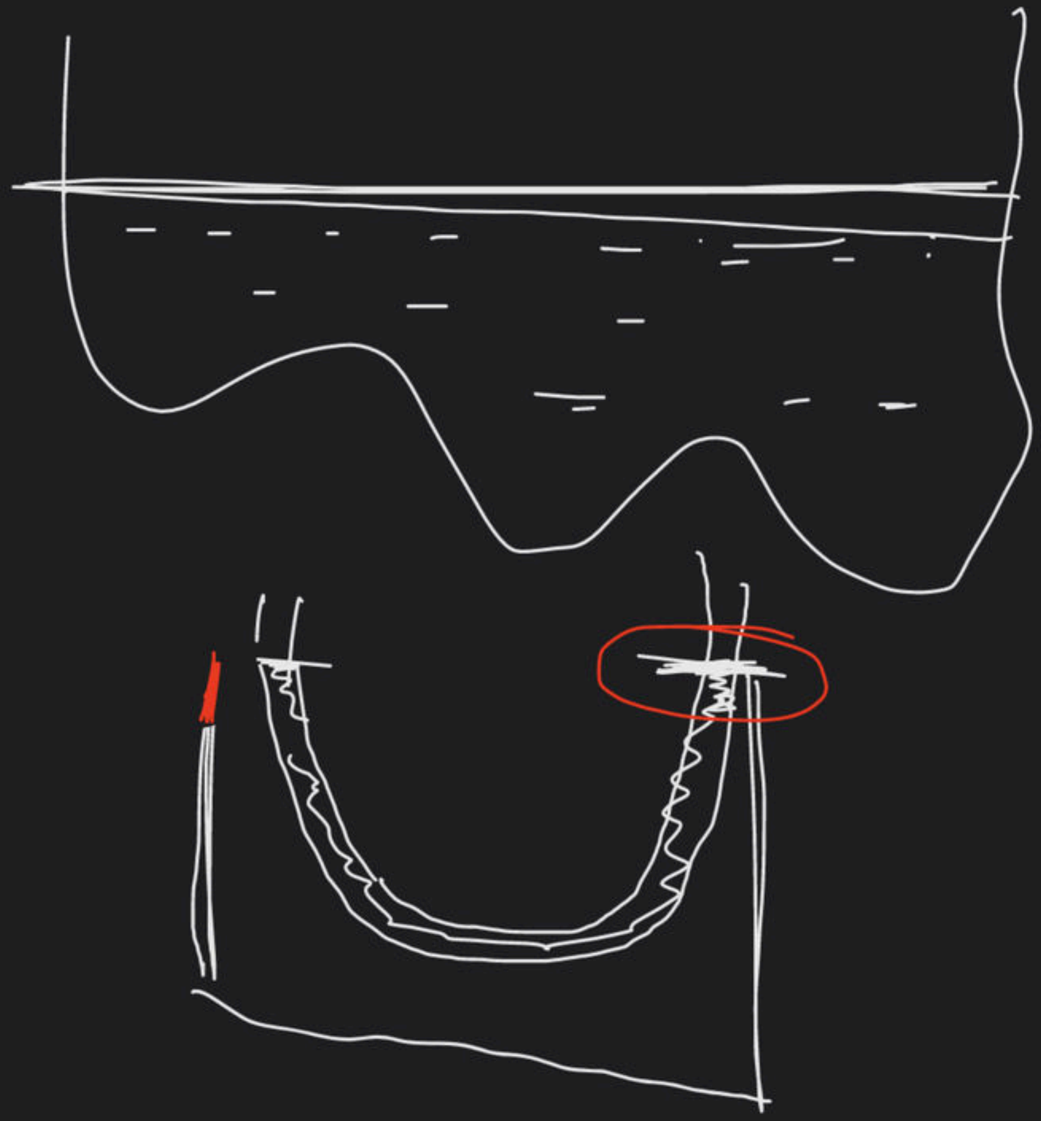


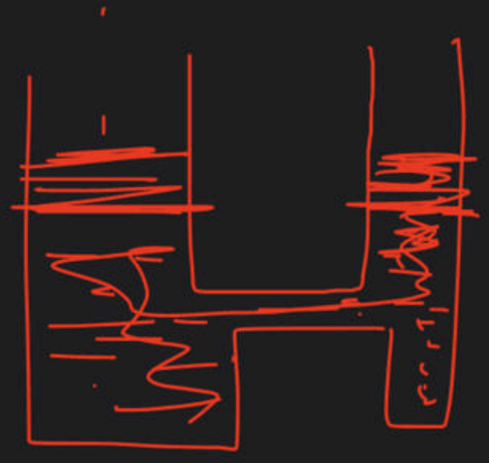
$$P = \frac{F}{A} = \frac{mg}{A} = \frac{(A \times h)\, d\, g}{A}$$

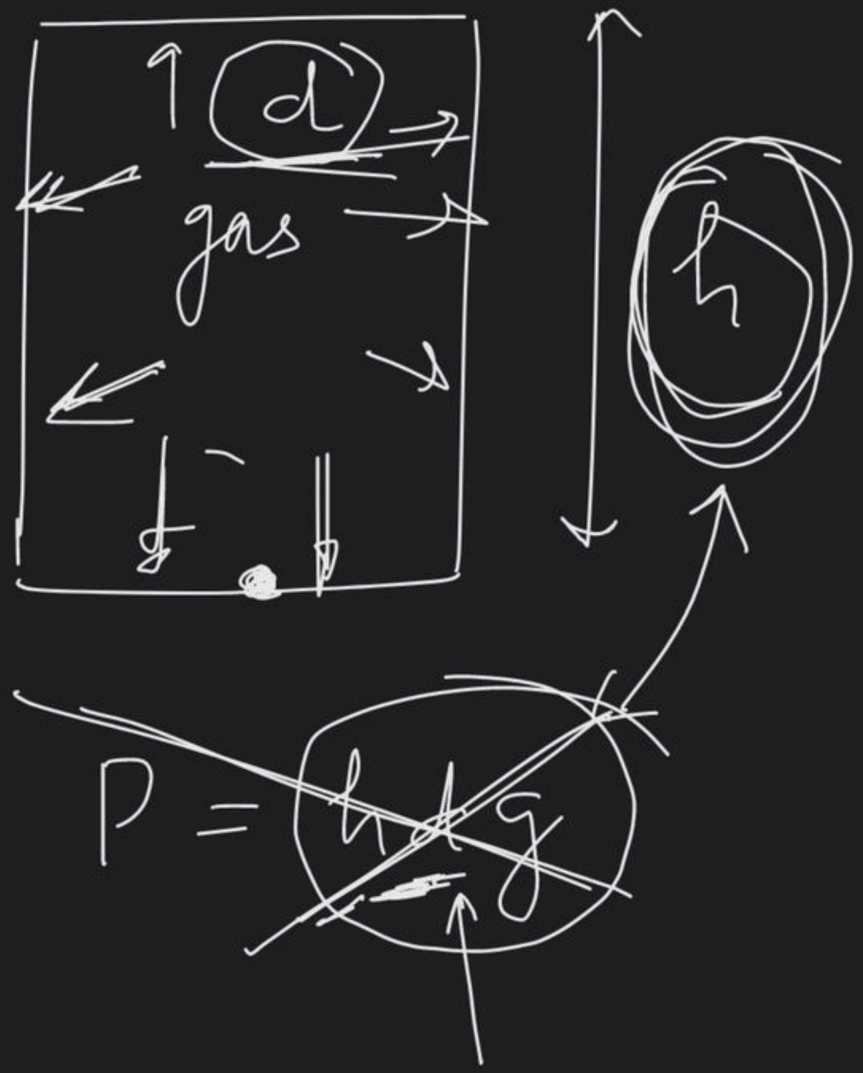
$$P = h d g$$

$$P = h d g$$

$$g = 9.8\ m/sec^2$$

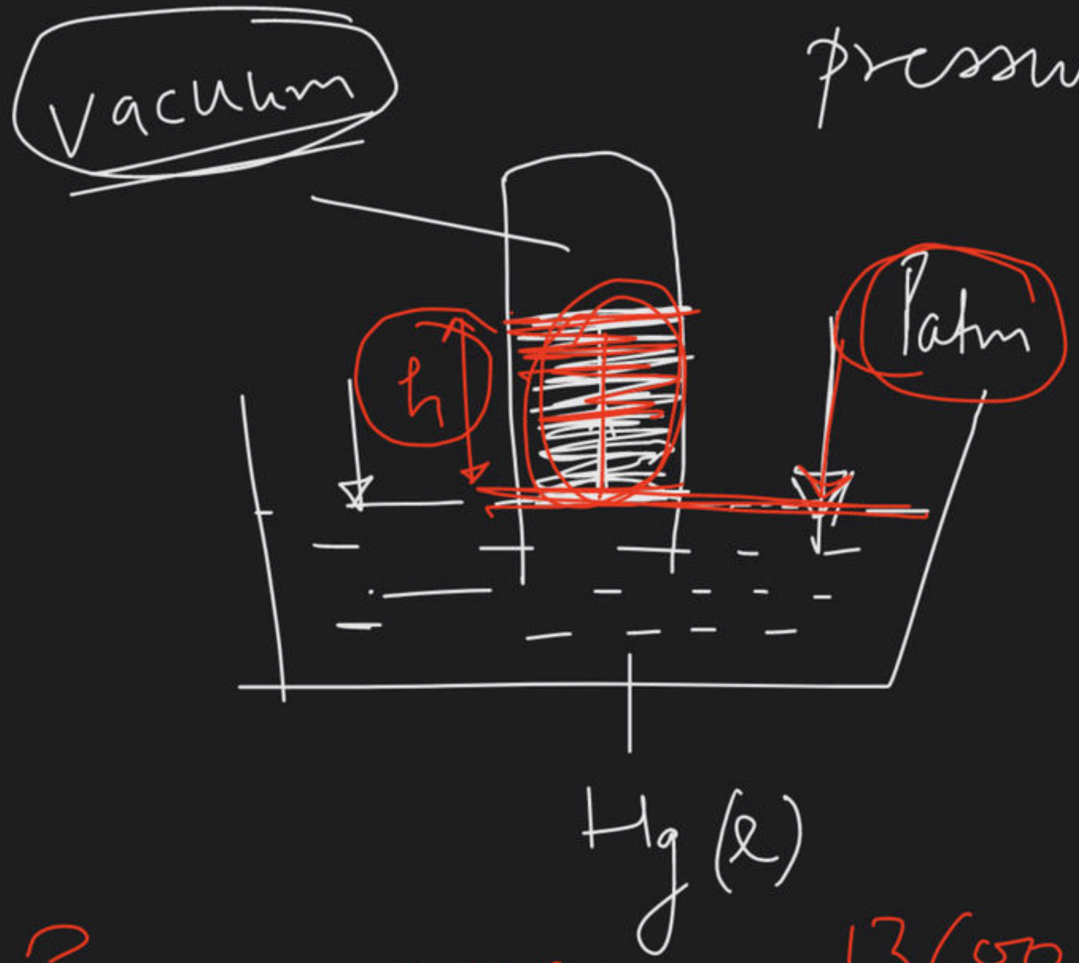






Pressure exerted by the gases is due to its collision with walls

Barometer :→ Used to measure atmospheric pressure.



$h d g = P_{atm}$

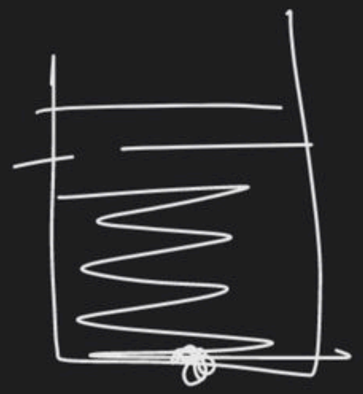
$d = 13.6 \text{ gm/ml}$

$h = 760 \text{ mm of Hg} = 760 \text{ torr}$

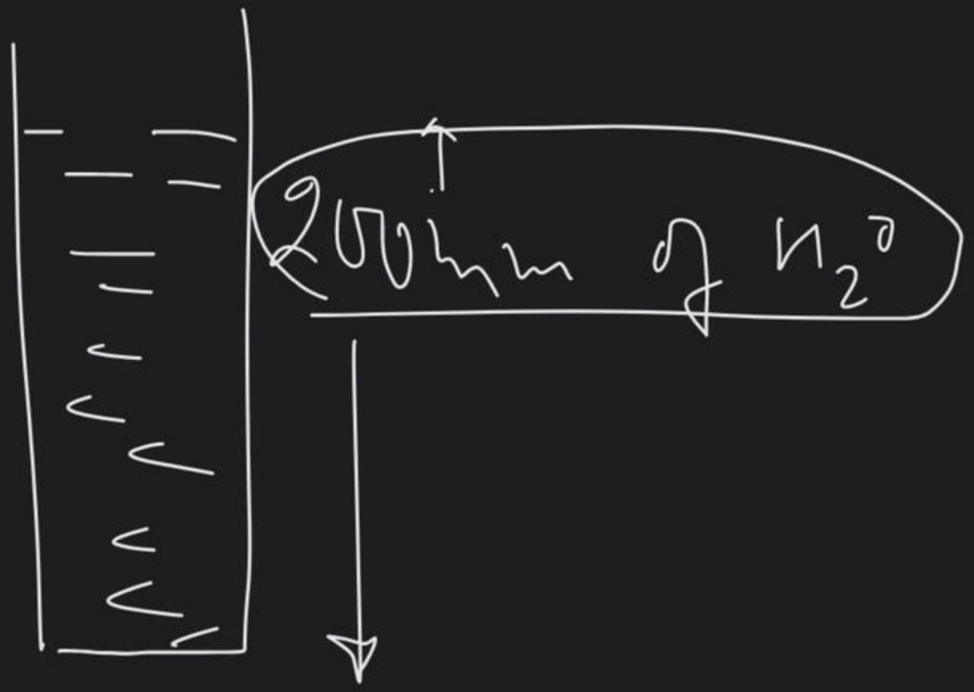
$= 76 \text{ cm of Hg}$

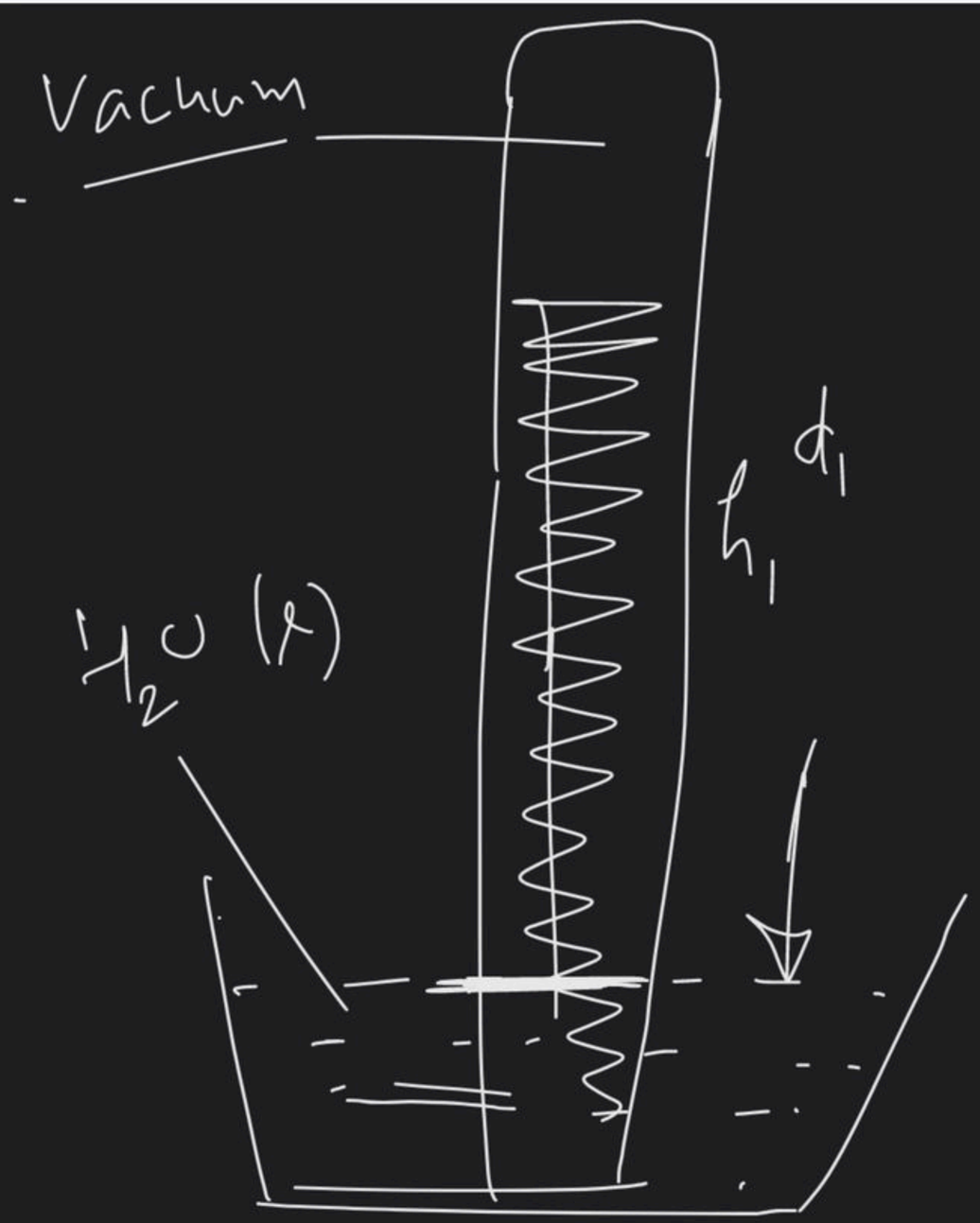
$P_{atm} = 0.76 \text{ m} \times 13600 \text{ kg/m}^3 \times 9.81 \text{ m/sec}^2$

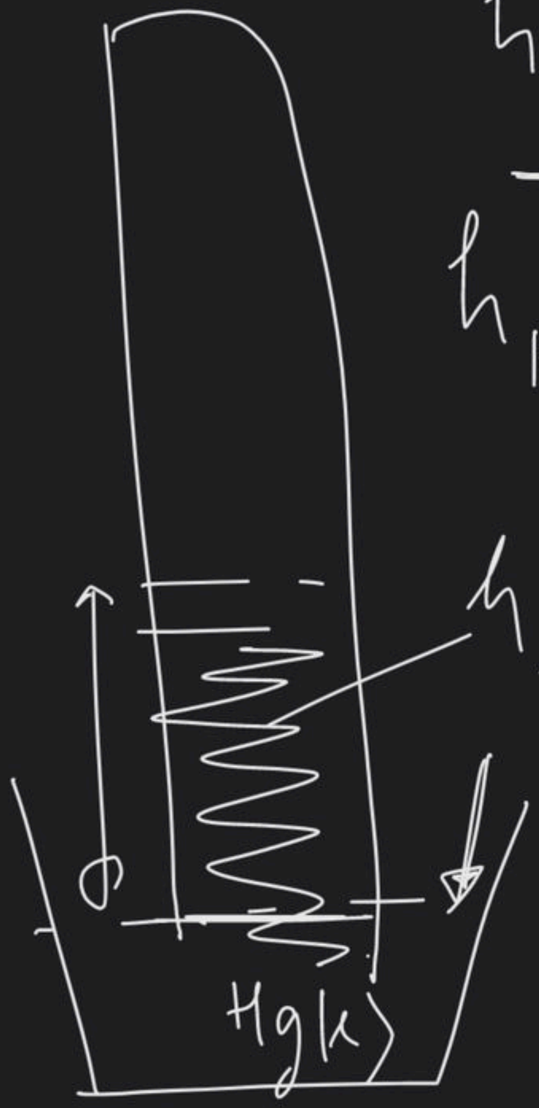
$$P_{atm} = 1.01325 \times 10^5 \text{ Pa} = 1 \text{ atm}$$



760 mm of Hg







$$h_1 d_1 = h_2 d_2$$

$$h_{H_2O} \times 1 = 76\,cm \times 13.6$$

$$h = 1033.6\,cm$$

$$= 10.33\,m$$

find the height of $H_2O(l)$ column which exerd = 1 atm (or 760 mm of Hg).

$$h_1 d_1 = h_2 d_2$$

$$h \times d = 76 \times 13.5$$

1 atm = 760 mm of Hg

= 760 torr

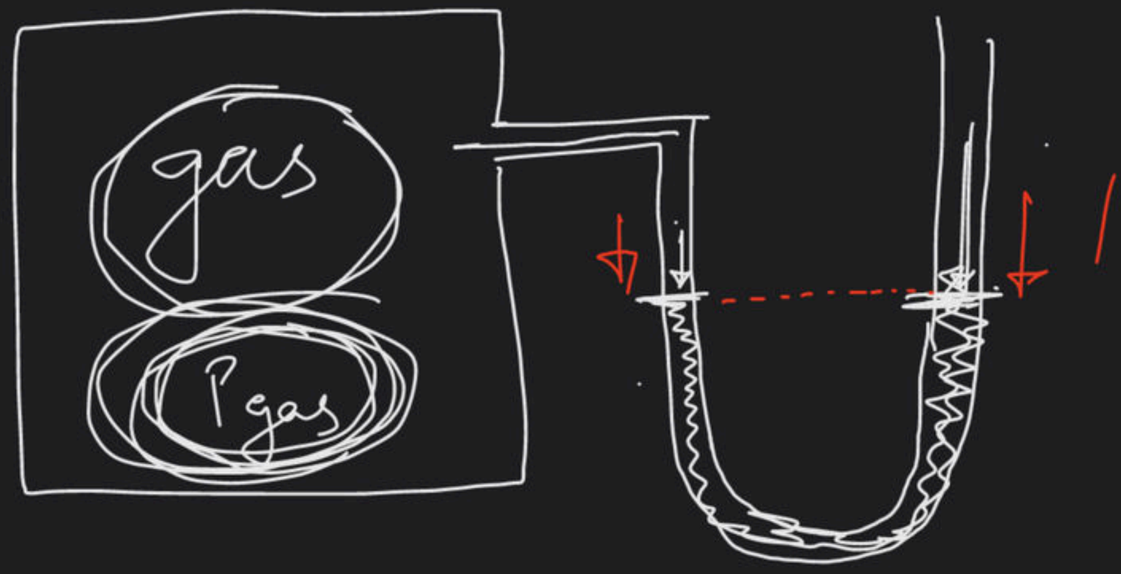
= 1.01325×10^5 Pa

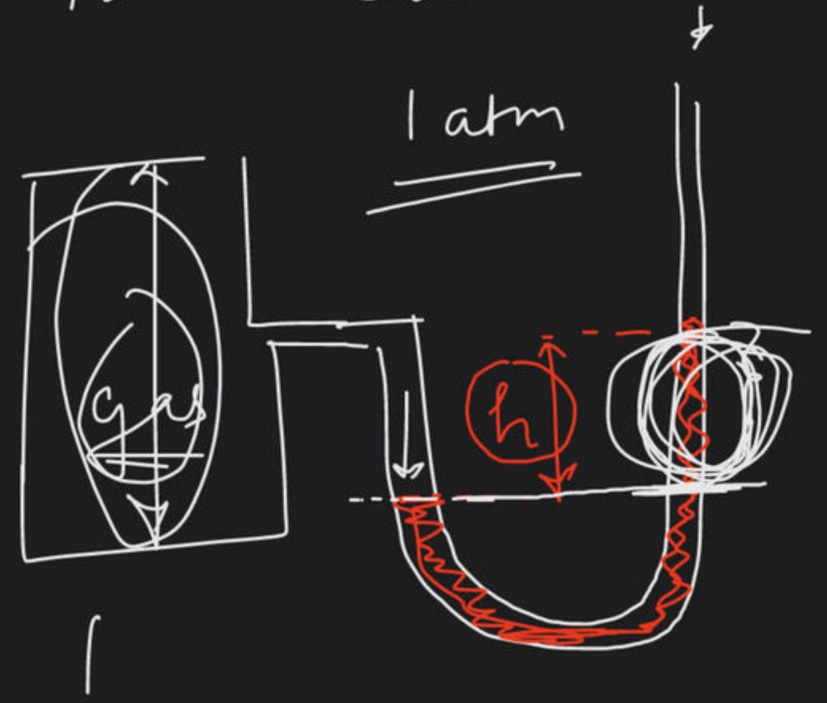
= 1.01325 bar

≈ 10.33 m of $H_2O(l)$

1 bar = 10^5 Pa

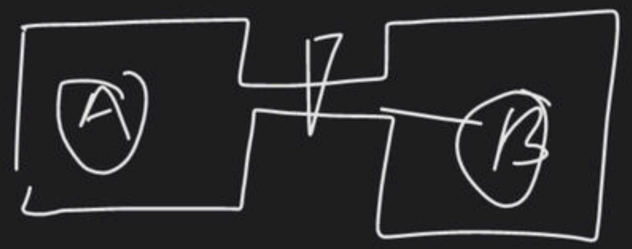
Manometer :→ It is used to measure the pressure of gas :→

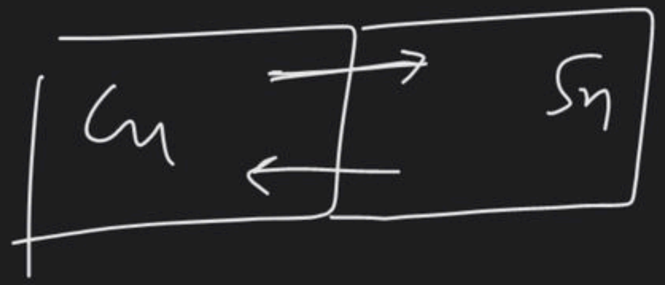




$$P_{gas} = P_{atm} + h d g$$

$$= (760\,mm + h)\, dg$$


A
B


Cn
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