Gas Laws:

① **Boyle's Law**: For fixed amount of gas at constant temperature, volume occupied by the gas is inversely proportional to pressure of the gas.

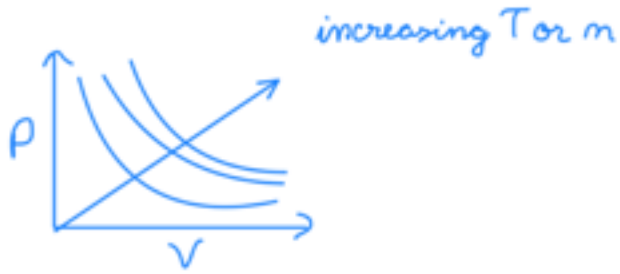
$$\Rightarrow \quad V \propto \frac{1}{P}$$

$\Rightarrow$ Hence, $\boxed{PV = \text{constant } (K)}$

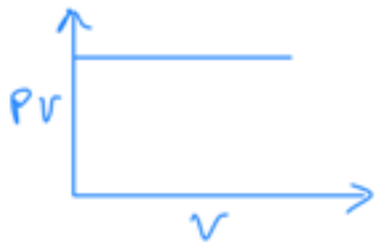
$$\Rightarrow \quad \boxed{P_1 V_1 = P_2 V_2}$$

Graphical Representation of Boyle's Law:

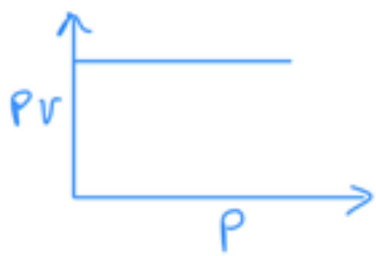
① P v/s V:



(ii) PV v/s V:



(iii) PV v/s P:



(iv) P v/s $\frac{1}{V}$:

(ii) Charle's Law : For Fixed amount of gas at constant Pressure :

$\Rightarrow V \propto T$

$\Rightarrow V = KT$

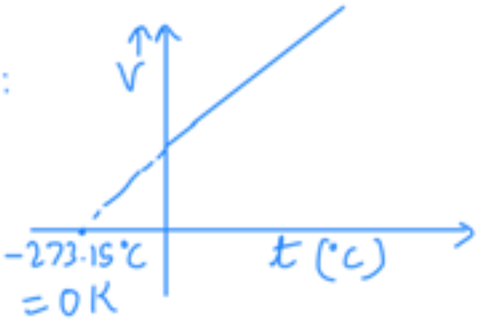
$\therefore \boxed{\frac{V}{T} = \text{constant}(K)}$

T → Temp on absolute Scale, Kelvin Scale.

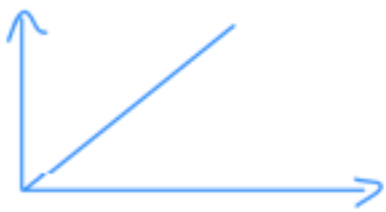
$$\boxed{\frac{V_1}{T_1} = \frac{V_2}{T_2}}$$

Graphical Representation :

(i): V v/s t(°C) :



(ii) V v/s T :



Important Points :

- Since volume is proportional to absolute temperature, the volume of a gas should be theoretically zero at absolute zero temperature.
- In fact, no substance exists as gas at a temperature near absolute zero, though the straight line plots can be inter polated to zero volume. Absolute zero can never be attained practically though it can be approached only.
- By considering −273.15°C as the lowest approachable limit, Kelvin developed temperature scale which is known as absolute scale.

(iii) Gay - Lussac's Law: For Fixed amount of gas at constant volume;

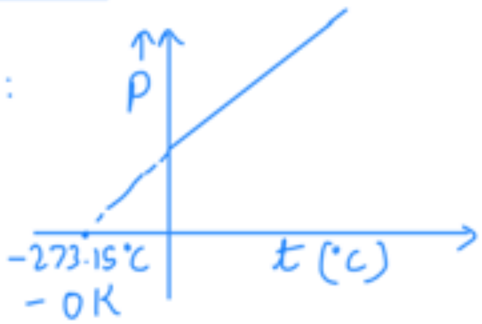
$\Rightarrow$ $P \propto T$

where T is temp in absolute scale.

$\therefore$ $\frac{P}{T}$ = constant (K)

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

P v/s t(°C):



(iv): Avogadro's Law:

Equal volumes of all gases under similar conditions of Temp and Pressure contains equal number of molecules or moles of molecules (not atoms).

$V \propto N$ — T & P constant

$V \propto n$

where N = Number of molecules

& n = Number of moles of molecules.

$$\frac{V_1}{N_1} = \frac{V_2}{N_2} \quad \text{or} \quad \frac{V_1}{n_1} = \frac{V_2}{n_2}$$