

VESP Vision

To be the centre of excellence in the field of technical education.

Program Code:-Common to all 1st semester

Course Name:-Basic Science(Physics)

Course Code : - 22102

Course coordinator: Mrs. Deepa Gupte

Date: 12/09/2020



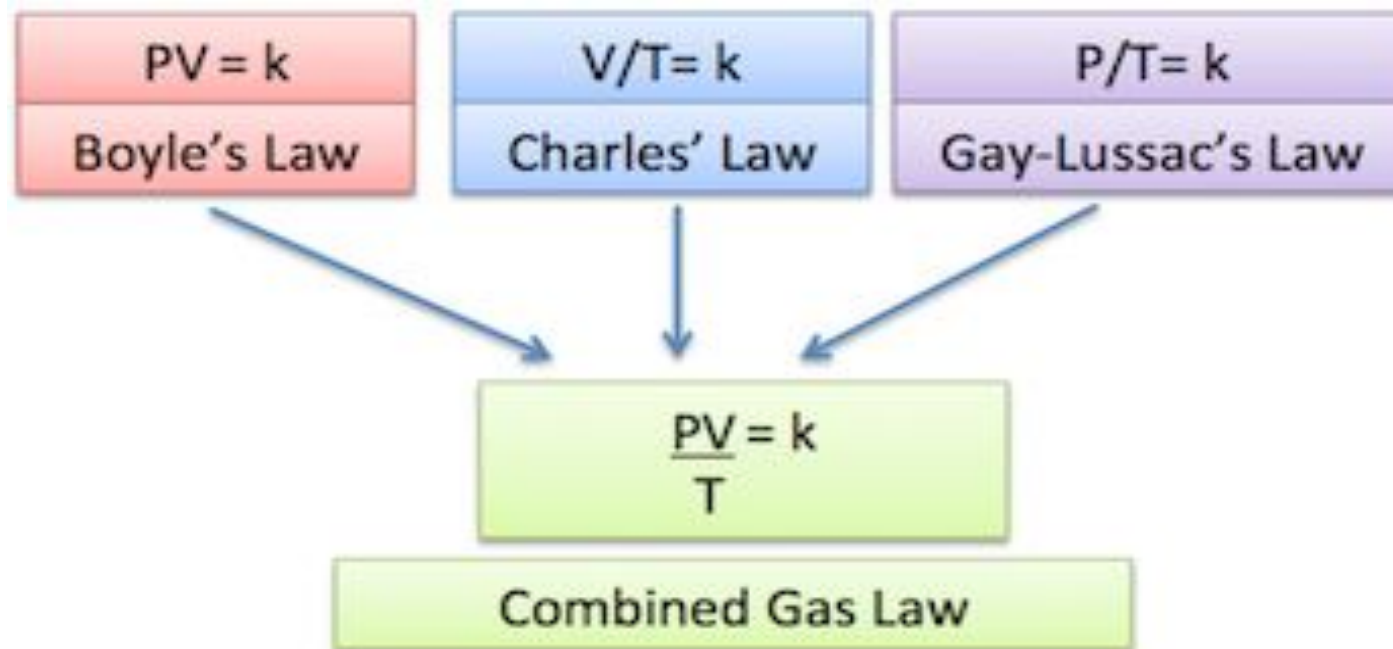
Unit No:3

Unit Name: Heat and Optics

Unit Outcomes(UO3b) **Relate the properties of three gas laws**

Learning Outcome (LO3) :**Students will be able to explain the three gas laws and general gas equation.**





- - ▶ Students will be able to relate the properties of three gas laws
- - ▶ Students will be able to explain the three gas laws and general gas equation



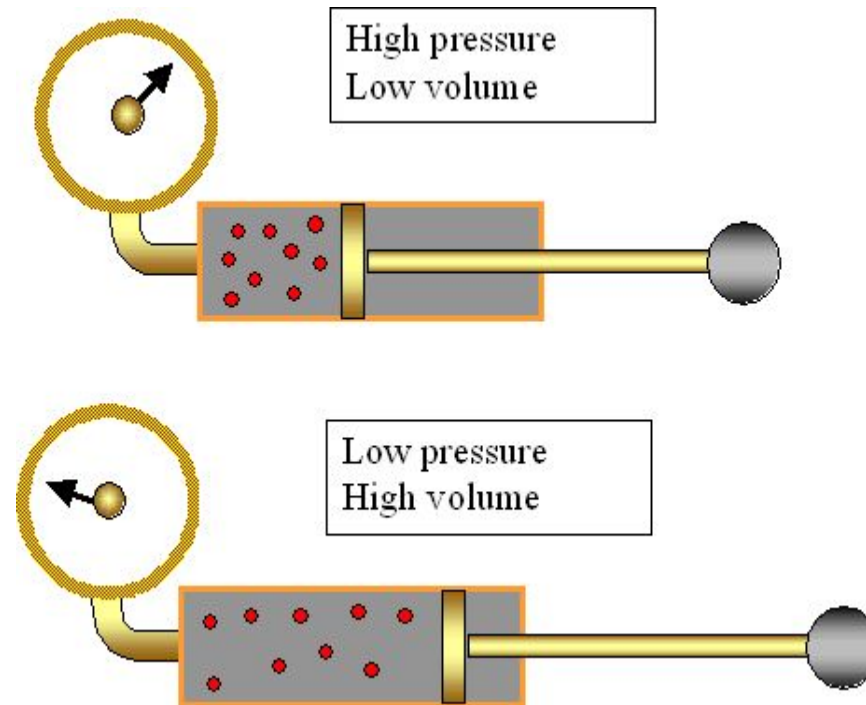
Boyle's Law

It states that for a fixed mass of a gas volume is inversely proportional to its pressure

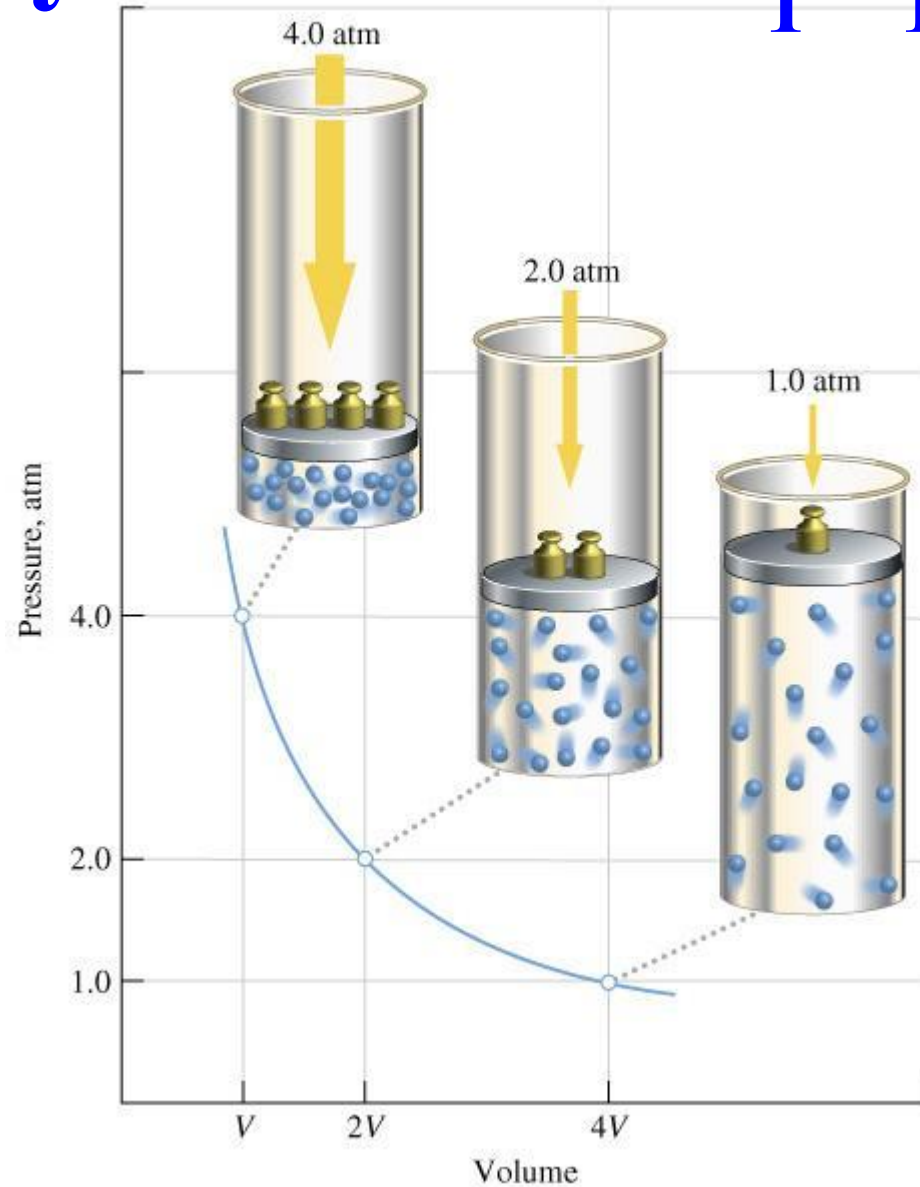
$$p \propto 1/v$$

$$PV = \text{constant}$$

Boyle's Law

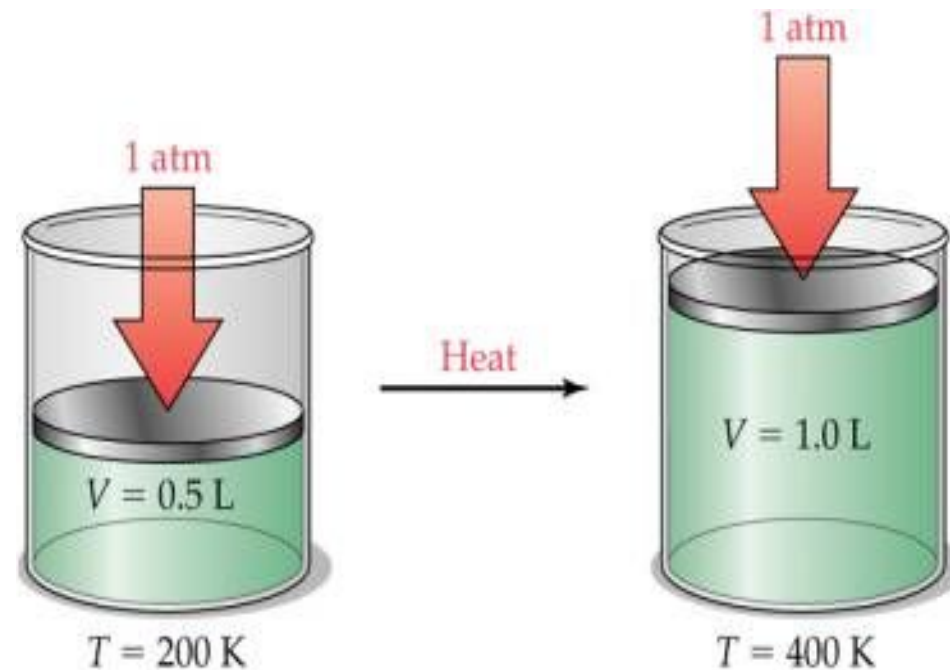


Boyle's Law: $P_1 V_1 = P_2 V_2$

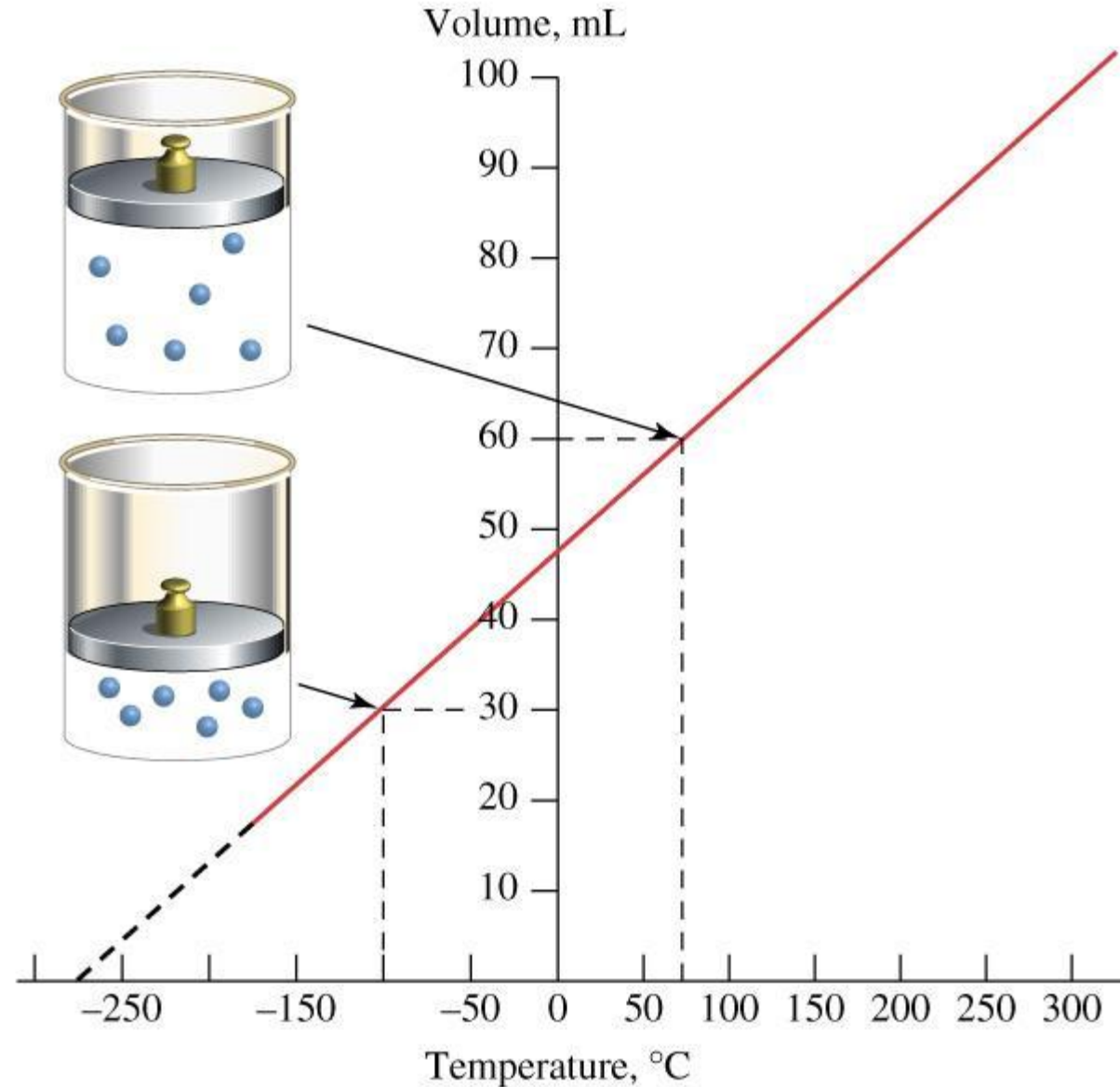


Charles's law states that for fixed mass of gas, volume is directly proportional to the absolute temperature at constant pressure.

$V \propto T$

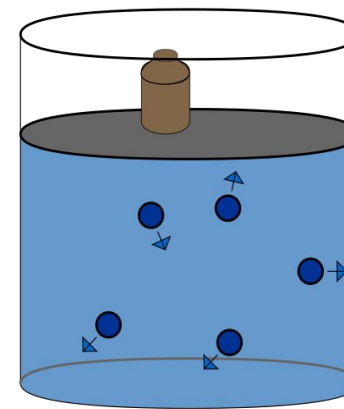


Charles' Law: $V_1/T_1 = V_2/T_2$

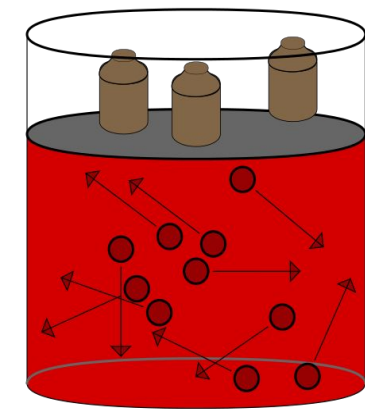


Gay-lussac's law states that for fixed mass of gas, pressure is directly proportional to the absolute temperature at constant volume

$$P \propto T$$

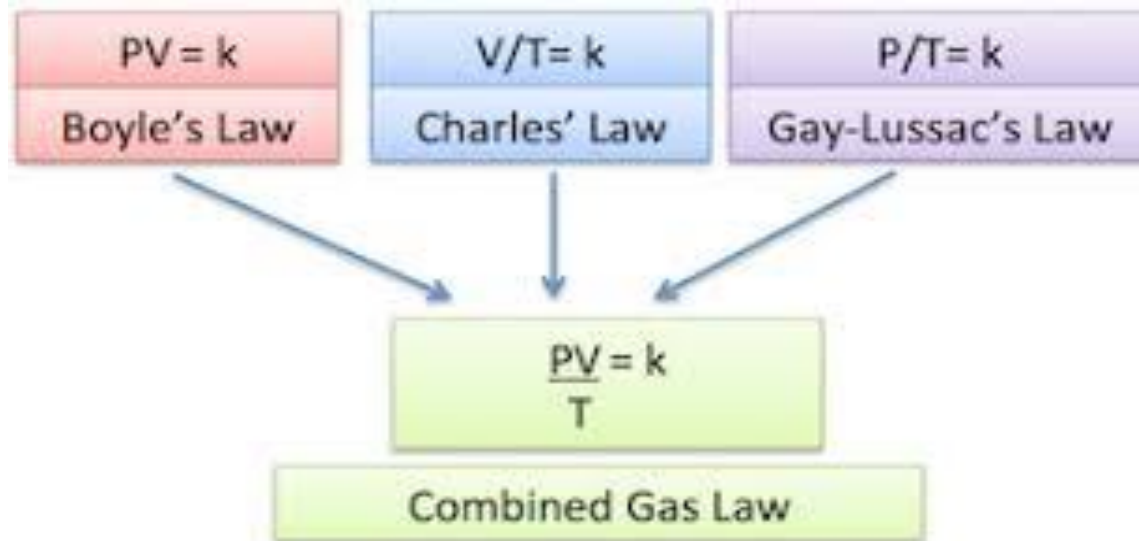


Temperature T



Temperature 3T





$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$



An “ideal” gas exhibits certain theoretical properties. Specifically, an ideal gas ...

- ▶ **Obeys all of the gas laws under all conditions.**
- ▶ **Does not condense into a liquid when cooled.**
- ▶ **Shows perfectly straight lines when its V and T & P and T relationships are plotted on a graph.**

In reality, there are no gases that fit this definition perfectly. We assume that gases are ideal to simplify our calculations.



General Gas equation



Universal gas equation or General gas equation:-

According to Gay-lussac's law $P \propto T$

According to Charles's law $V \propto T$

hence we can write

$PV \propto T$

If mass of gas in Kg or gram

$PV = KT$ K-Specific gas constant

If gas in mole $K = R$

$PV = RT$ where R-Universal gas constant

$R = 8314.91 \text{ J/K Kg Mol}$



