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Maharashtra State Board Of Technical Education.

GOVERNMENT POLYTECHNIC, KARAD

A

Microproject

Report on

Gas laws And Its Applications

Under the subject

Basic science physics

(22102)

Semester 1: Computer Engineering

Academic 2021-22

Submitted by: 259-269

Under the guidance of

Mrs. Jaya Gawande

Acknowledgement

We take this opportunity to thank all those have directly and indirectly inspired. Directed and assisted us towards successfully completion of the project report

We express our sincere thanks to, Mrs. JAYA GAWANDE lecturer in CO of Govt. Polytechnic, KARAD for encouragement throughout the project reports and guideline in designing and working out this projects.

We are also grateful to this project highly encouraging and cooperative attitude. We express our sense of gratitude towards our friend and parents for their constant moral support during projects reports.

Place: GOVERNMENT POLYECHNIC KARAD.

Date: 30/12/2021

Yours sincerely,

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- **262_ Pratiksha Arjun Pawar**
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- **267_ Purva Murlidhar Jadhav**
- **268_ Purva Satish Kamble**
- **269_ Shweta Vasant Gawade**

CERTIFICATE

This is to verify that, as part of the partial fulfillment of the three years Diploma Course for the First semester, the benefited students studying in first Year Diploma (COMPUTER ENGINEERING) (I-scheme).

Sakshi Subhash Mohite, Akshata Subhash Bachche,Sumit Baban Mane,Pratiksha Arjun Pawar, Riya Sunil Kharade, Sanika Vilas Powar, Kartik Ramchandra Pawar, Samiksha Suryakant Sawant, Purva Murlidhar Jadhav, Purva Satish Kamble, Shweta Vasant Gawade have completed the project proposal titled as, "Gas Laws and Its Application ". For the subject - BASIC SCIENCE, PHYSICS (22102) .Under the guidance of Mrs. JAYA GAWANDE Submitted it to Government Polytechnic, Karad.

- **Mrs. Jaya Gawande**
  Project Guide

Mr.Hindurao Jadhav
Head of Department

➢ Rationale :

• Gas law's are important because they can be used to determine the parameters of a mass of Gas using theoretical means. The three fundamental gas laws discover the relationship of pressure, temperature, volume and amount of gas. Boyles law tells us that the volume of gas increases as the pressure decreases. Charles law tells us that the volume of gas increases as the temperature increases. Gay-Lussac's law's Tell Us That the pressure of a given mass of gas varies directly Proportional with the absolute temperature of the gas when the volume is kept constant.

•How do gas laws apply to everyday life:

1)Example: When a scuba diver exhales, water bubbles released grow larger as it reaches the surface. …

2)Example: The football which is inflated inside, shrinks when taken outdoors during winter. …

3)Example: It is important to check the pressure of the car tire before heading to a drive.

•This Gas Law's is Applied is Observed in Our Daily Life As Well As There are Lots Of Applications In Enginnering Field.

➢ Course outcomes Addressed

•To use the basic principles of gas laws in related engineering applications.

➢ Literature review :

•The gas law were developed at the end of the 18^{th} century, when scientists began to realize that relationships between pressure volume and temperature of a sample of a gas could be obtained which would hold to approximation for all gases.

There are Three Types Of Gas Law's:

1)Boyle's law states that at constant temperature, the volume of given mass of a gas is inversely proportional to the pressure.

2)Charle's law state that at constant pressure, the volume of given mass of gas is directly proportional to its absolute temperature T in °K.

3)Gay Lussac's Law states that at constant volume, the pressure (P) of a given mass of a gas is directly proportional to its absolute temperature.

➢ Proposed methodology

•First we discuss about the topic and select the name of microproject that is gas laws and its applications.

• We collect the information about gas laws and from internet or books.

• We distributed work among team members.

• Finally specific information was Include in Microproject.

➢ Actual Resources used :

SR. NO.	Name of the resources required	Specification	Qty
1	Computer system	Proper operating system	As per requirement
2	Wikipedia	As per resources	As per requirement

➢ Content Experimental:

GAWS LAWS AND ITS APPLICATION:

Definition of gas laws:

The inter relationship between Pressure ,volume and temperature which specifies state of gas is called gas laws.

The gas laws were developed towards the end of the 18^{th} century by numerous scientists.

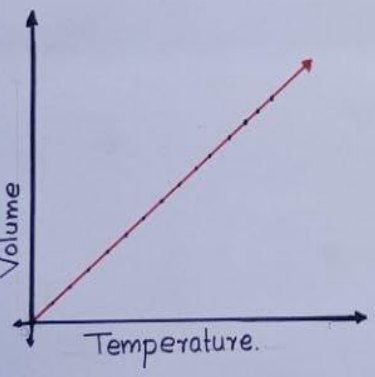
GASLAWS

Charle's Law

- Temperature
- Volume
- Directly Proportional

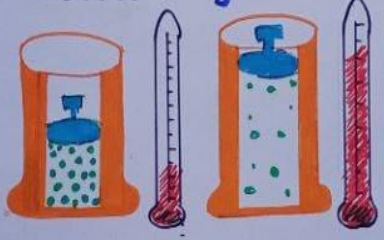
Temp. goes up

Volume goes up



Temp. goes down

Volume goes down

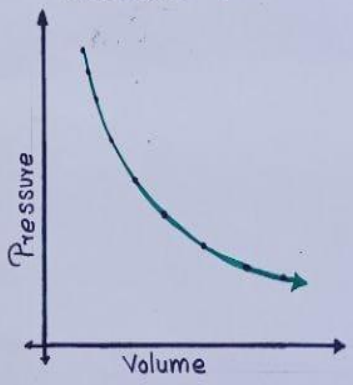


Boyle's Law

- Pressure
- Volume.
- Inverse proportional

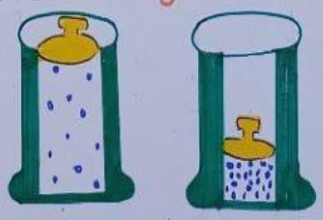
Volume goes down

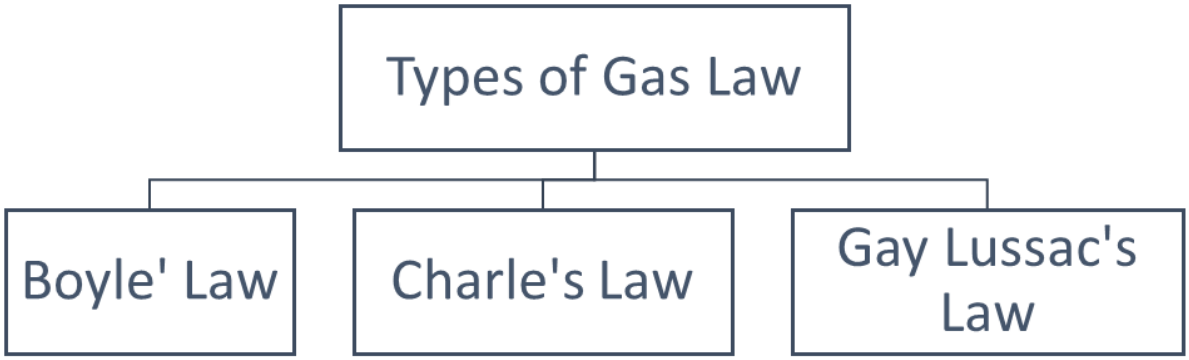
Pressure goes up



Volume goes up

Pressure goes down

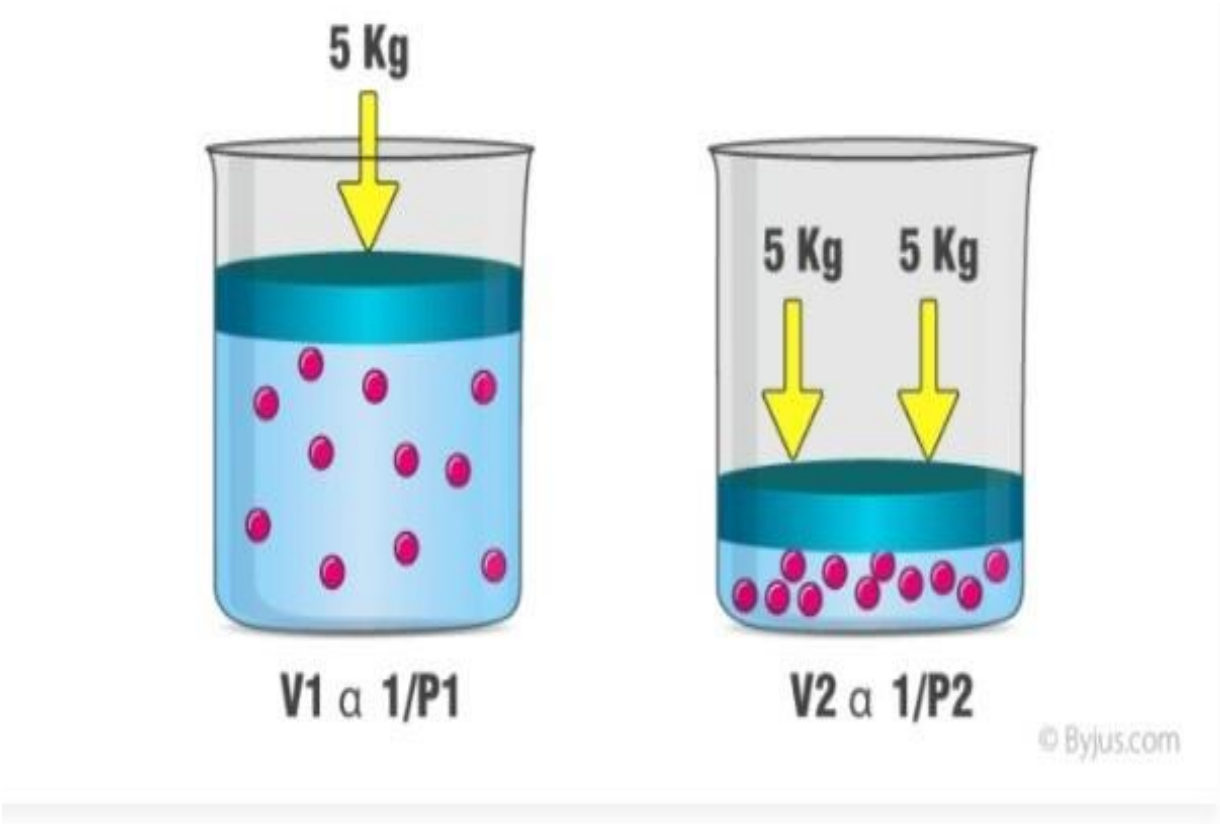




❖ **The Three Gas Laws are:**

1)Boyle’s law

This empirical relation, formulated by the physicist Robert Boyle in 1662, states that the pressure (p) of a given quantity of gas varies inversely with its volume (v) at constant temperature; i.e., in equation form, pv=k, a constant. The relationship was also discovered By The French Physicist Edme Mariotte (1676).



- **<u>Boyle's law formula and derivation:-</u>**

As per the Boyle's law, any change in the volume by a gas (at constant quantity and temperature) will result in the change in the pressure exerted by it. In other words the product of the initial pressure and the initial volume of the gas is equal to the product of its final pressure and final volume (at constant temperature and number of moles).

This law can be expressed mathematically as follows:

$$P_1V_1 = P_2V_2$$

Where,

- P_1 is the initial pressure exerted by gas.
- V_1 is the initial volume occupied by the gas.
- P_2 is the final pressure exerted by the gas.
- V_2 is the volume occupied by the gas.

This expression can be obtained from pressure-volume relationship suggested by Boyle's law. For a fixed amount of gas kept at constant temperature, PV = k .

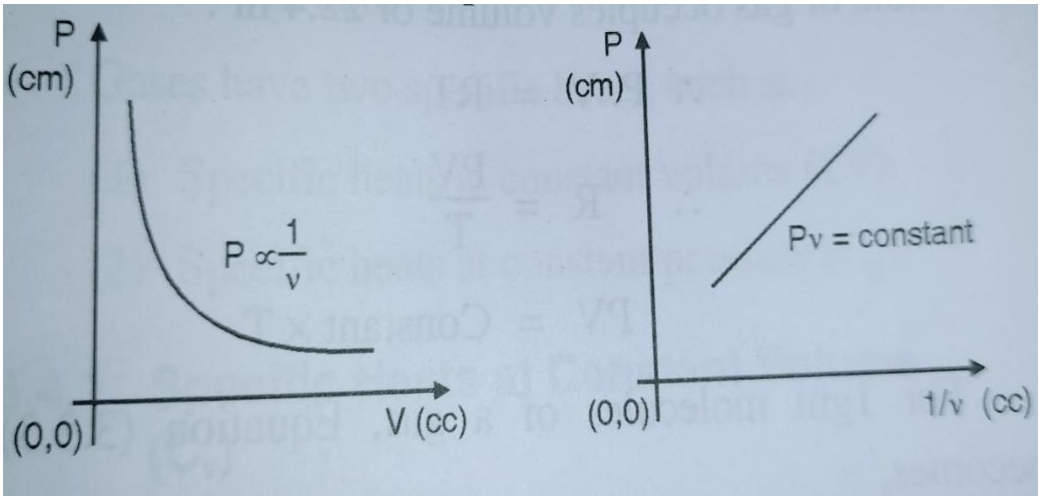
Therefore,

P_1V_1 = k (initial pressure *initial volume).

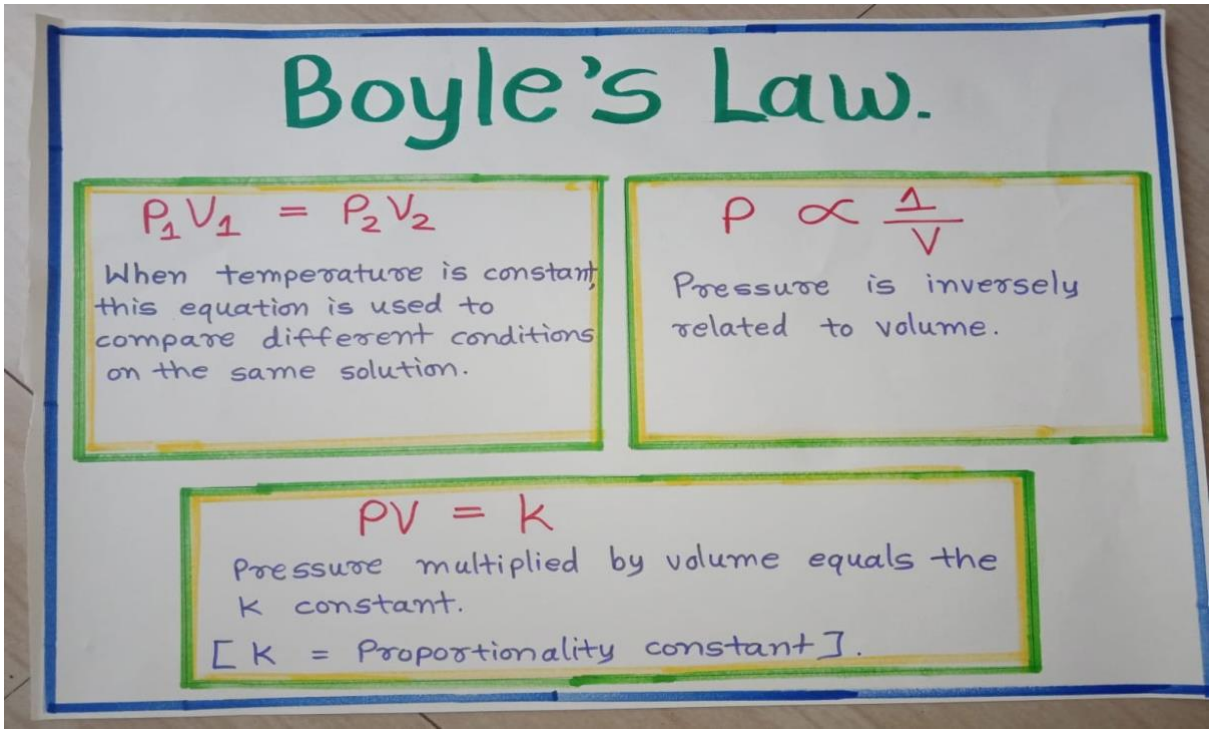
P_2V_2=k (final pressure *final volume).

Hence,

$$P_1V_1 = P_2V_2$$



This equation can be used to predict the increase in the pressure exerted by gas on the walls of its container when volume of its container is decreased (and its quantity and absolute temperature remains unchanged).


Boyle's Law.
$P_1V_1 = P_2V_2$
When temperature is constant, this equation is used to compare different conditions on the same solution.
$P \propto \frac{1}{V}$
Pressure is inversely related to volume.
$PV = k$
Pressure multiplied by volume equals the k constant.
[k = Proportionality constant].

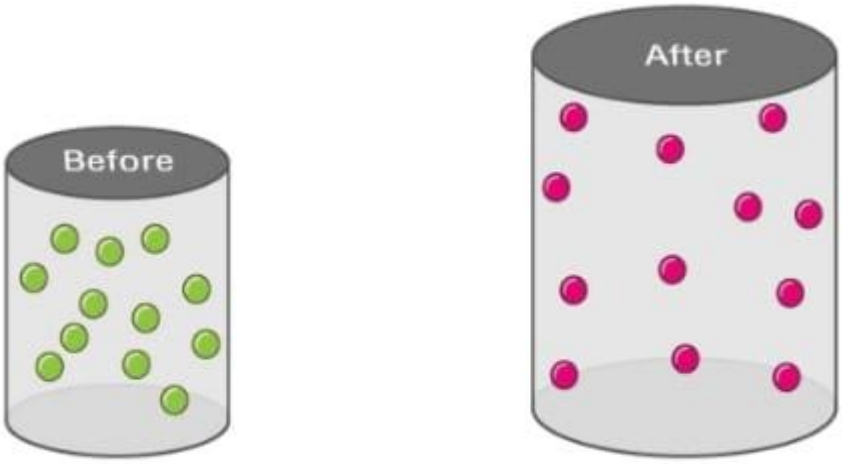
- **Application of Boyle's law :**

1. Soda Can :

2.Spray Paint:

2)Charle’s law :

Charle’s Law, states that the volume occupied by a fixed amount of gas is directly proportional to its absolute temperature, if the pressure remains Constant. This empirical relation was first suggested by the French physicist J.-A.-C. Charles about 1787.
Constant. This empirical relation was first suggested by the French physicist J.-A.-C. Charles about 1787.



$$V1 / T1 = V2 / T2$$

- **Charle's Law Formula and derivation:**

When pressure on a sample of a dry gas is held constant, the Kelvin temperature and the volume will be in direct proportion.

This relationship of direct proportion can be written as:

V=T

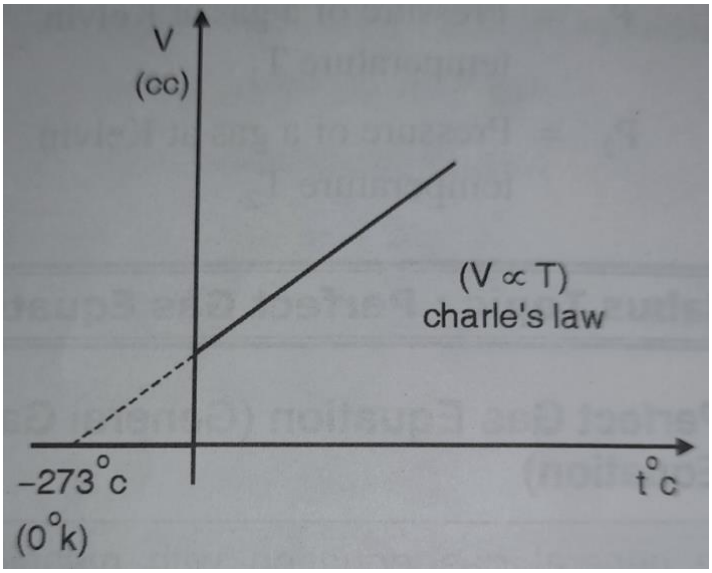
So this means:

V = KT

where:

Vis the volume of the gas,

T is the temperature of the gas (measured in kelvins),and k is a non-zero constant.

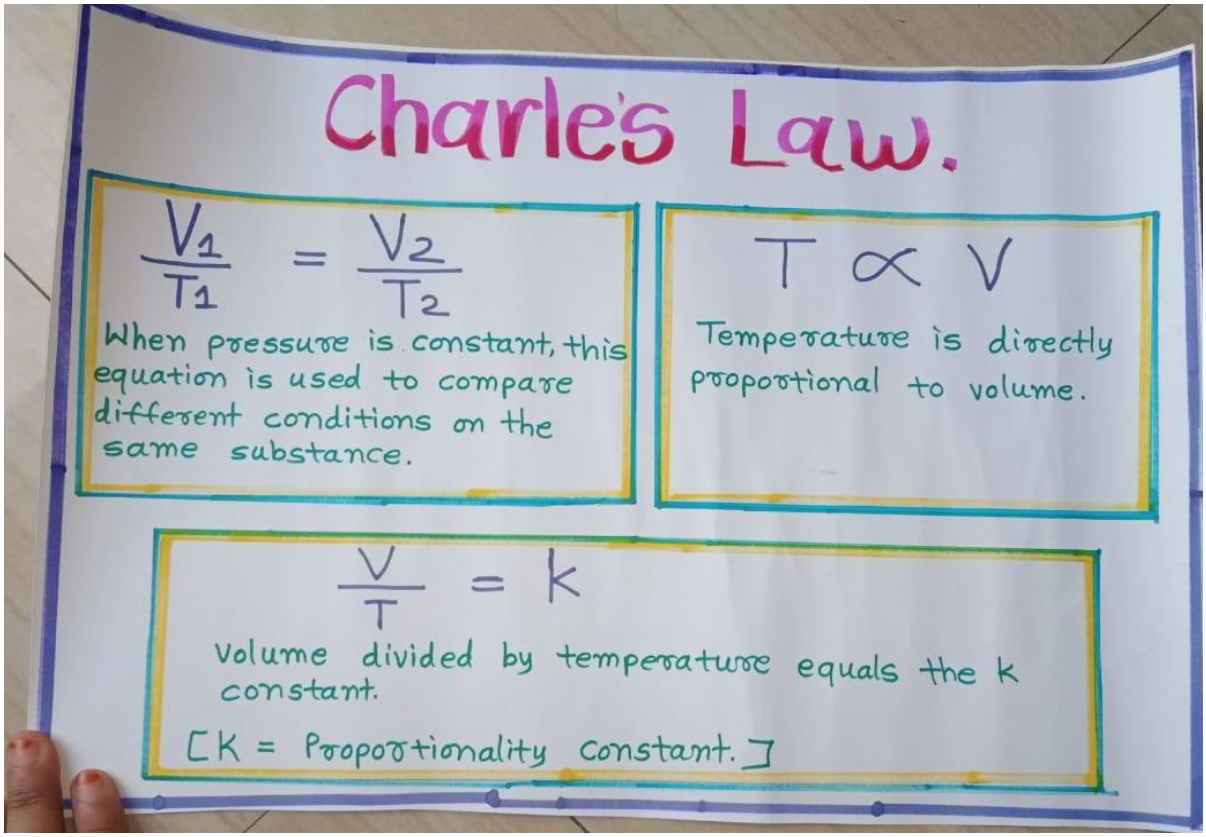


This law describes how a gas expands as the temperature increases; conversely, a decrease in temperature will lead to a decrease in volume. For comparing the same substance under two different sets of conditions, the law can be written as:

The equation shows that, as absolute temperature increases, the volume of gas also increases in proportion.

V1/T1=V2/T2

The gas also increases in proportion.


Charle's Law.
$\frac{V_1}{T_1} = \frac{V_2}{T_2}$
When pressure is constant, this equation is used to compare different conditions on the same substance.
$T \propto V$
Temperature is directly proportional to volume.
$\frac{V}{T} = k$
Volume divided by temperature equals the k constant.
[K = Proportionality constant.]

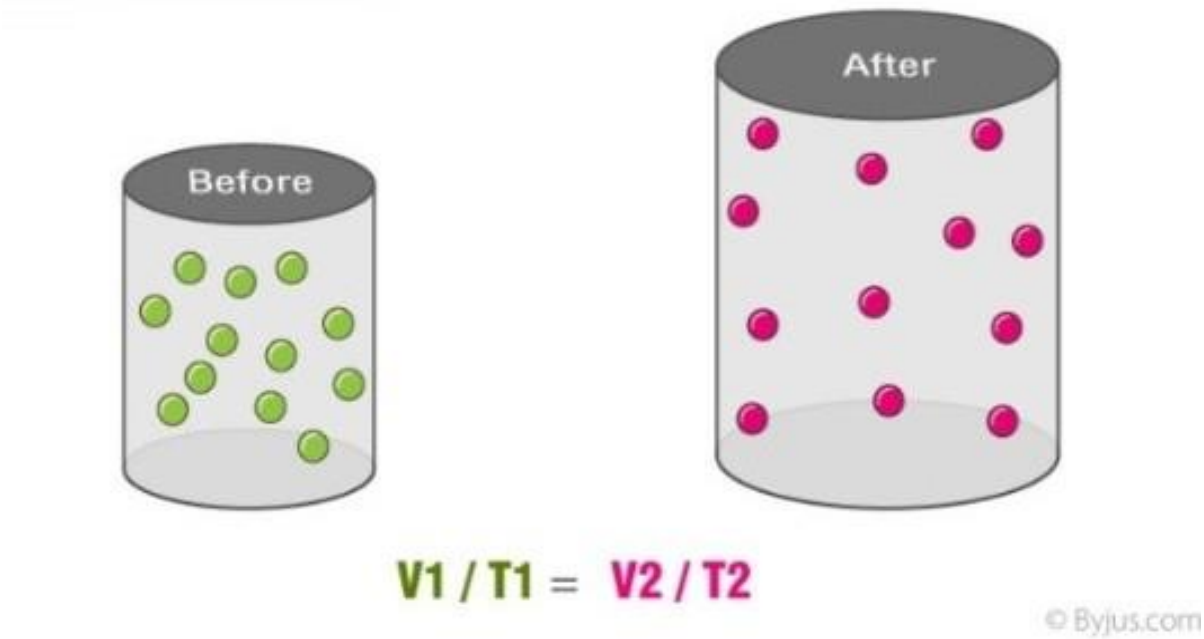
- **<u>Application of Charles law:</u>**

1)Helium Bulloon on a cold day

2)The Dented Ping- Pong ball :

3)Gay Lussac’s Law:

Gay-Lussac's law (also referred to as Amonton's law [citation needed]) states that the pressure of a given mass of gas varies directly with the absolute temperature of the gas when the volume is kept constant. This empirical relation was first suggested by the French physicist Joseph Louis Gay-Lussac about 19 century.



- **Gay Lussac's Law Formula and Derivation:**

Gay-Lussac's Law implies that the ratio of the initial pressure and temperature is equal to the pressure of the final pressure and temperature for a gas of a fixed mass kept at a constant volume. This formula can be expressed as follows:

P-initial pressure

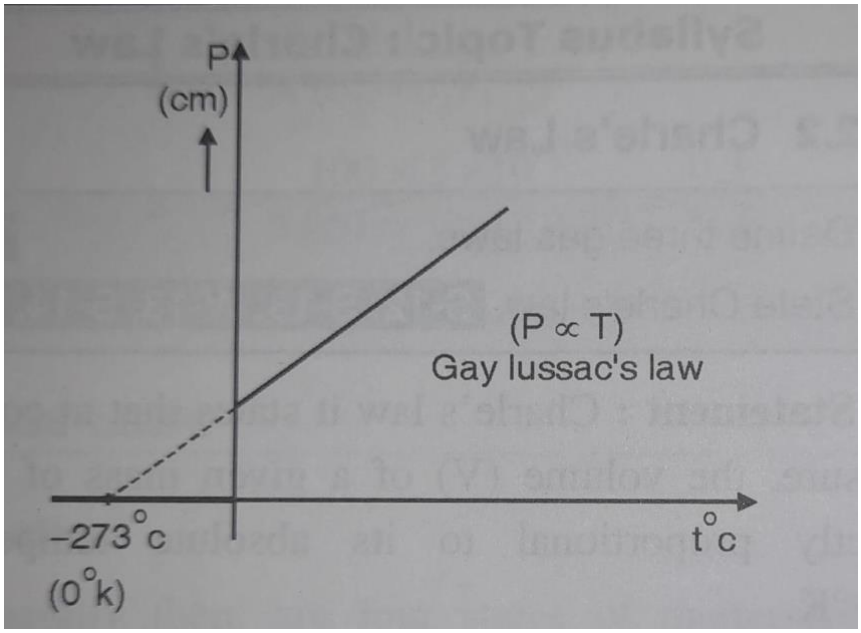
T-initial temperature

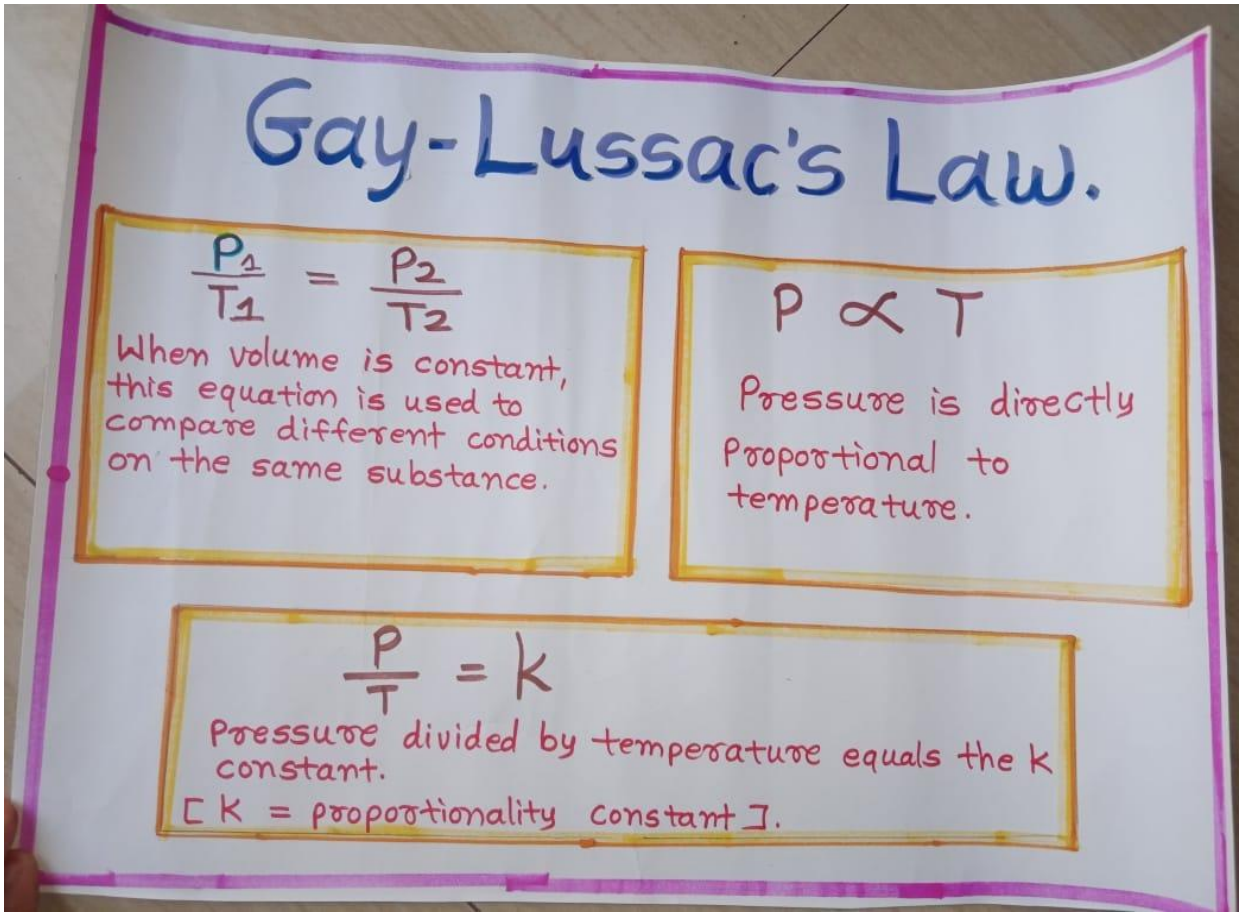
plt1 = p2t2

p = final pressure

t-final temperature

k=constant





- **<u>Aplication of Gay Lussac's Law :</u>**

1)Firing a bullet :

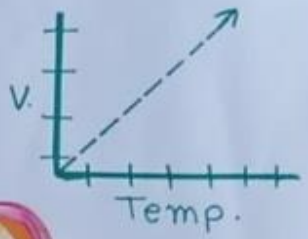
2)**A Burning Automobile fire :**

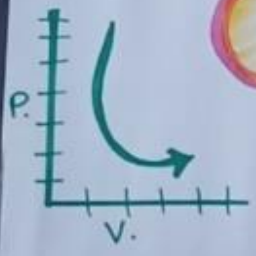
Gas Behaviors

- **Charle's Law** — When pressure is constant and temperature increases, volume also increases

- **Directly Proportional**

→ Straight line that passes through the origin.





→ Product of 2 variables is constant.

- **Inversely Proportional**

When temperature is constant and pressure increases, volume decreases.

- **Boyle's Law** —

●Conclusion●

All gases generally show similar behaviour when the conditions are normal. But with a slight change in physical conditions like pressure, temperature or volume these show a deviation. Gas laws are an analysis of this behaviour of gases. The variables of state like the Pressure, Volume and Temperature of a gas depict its true nature. Hence gas laws are relations between these variables.

●Outputs of microproject ●

1. We can identify the different applications of gas laws in daily life.

2. We apply different applications of gas law in daily life.

● Skill Developed ●

1) we understand that relationship between Pressure, Temperature & Volume In gas behaviour.

2) Communication Skills Developed in all team members.

3)Also Presentation Skill Developed Very Well.

THANKYOU !!!!