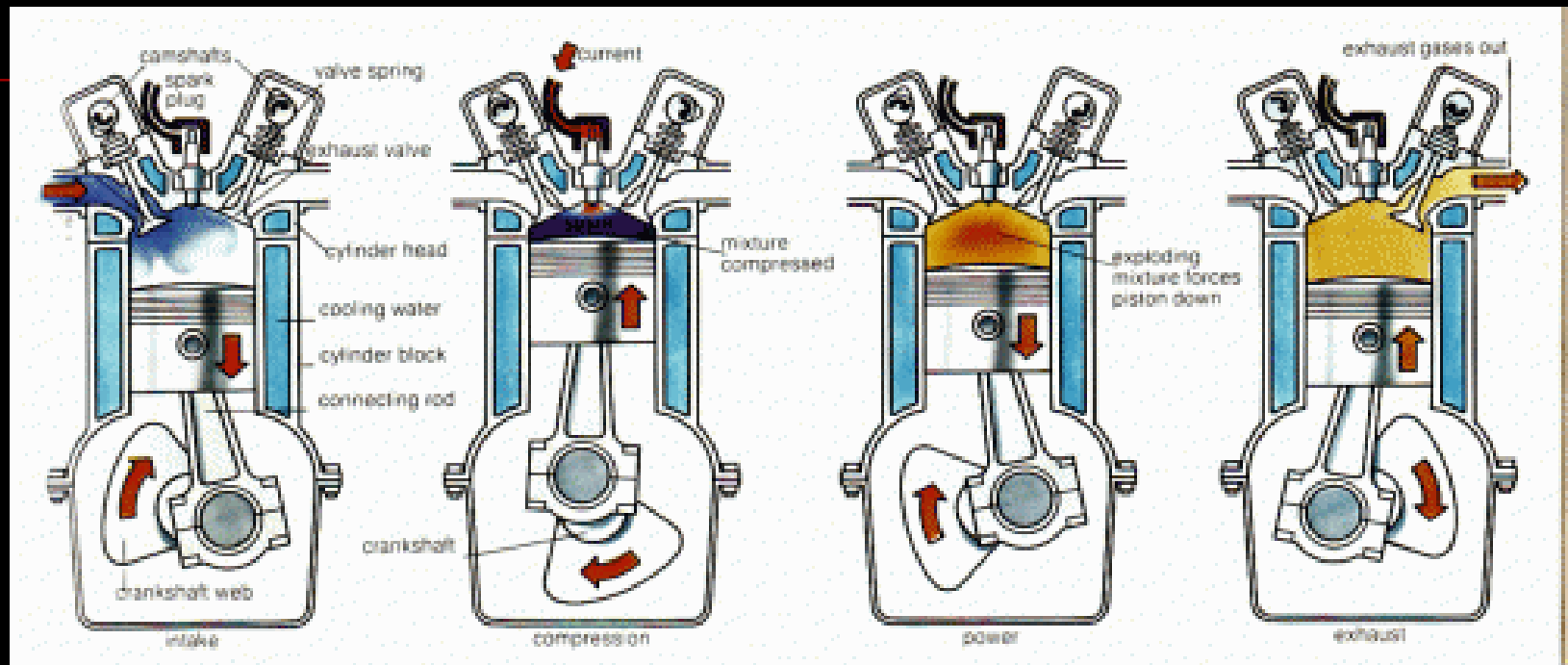


# Teori Kinetik Gas

## (Bagian I)

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Fisika Kelas XI Sem Ganjil



[https://www.youtube.com/watch?v=mn\\_iPR3U7Xw](https://www.youtube.com/watch?v=mn_iPR3U7Xw)

# Kompetensi Dasar

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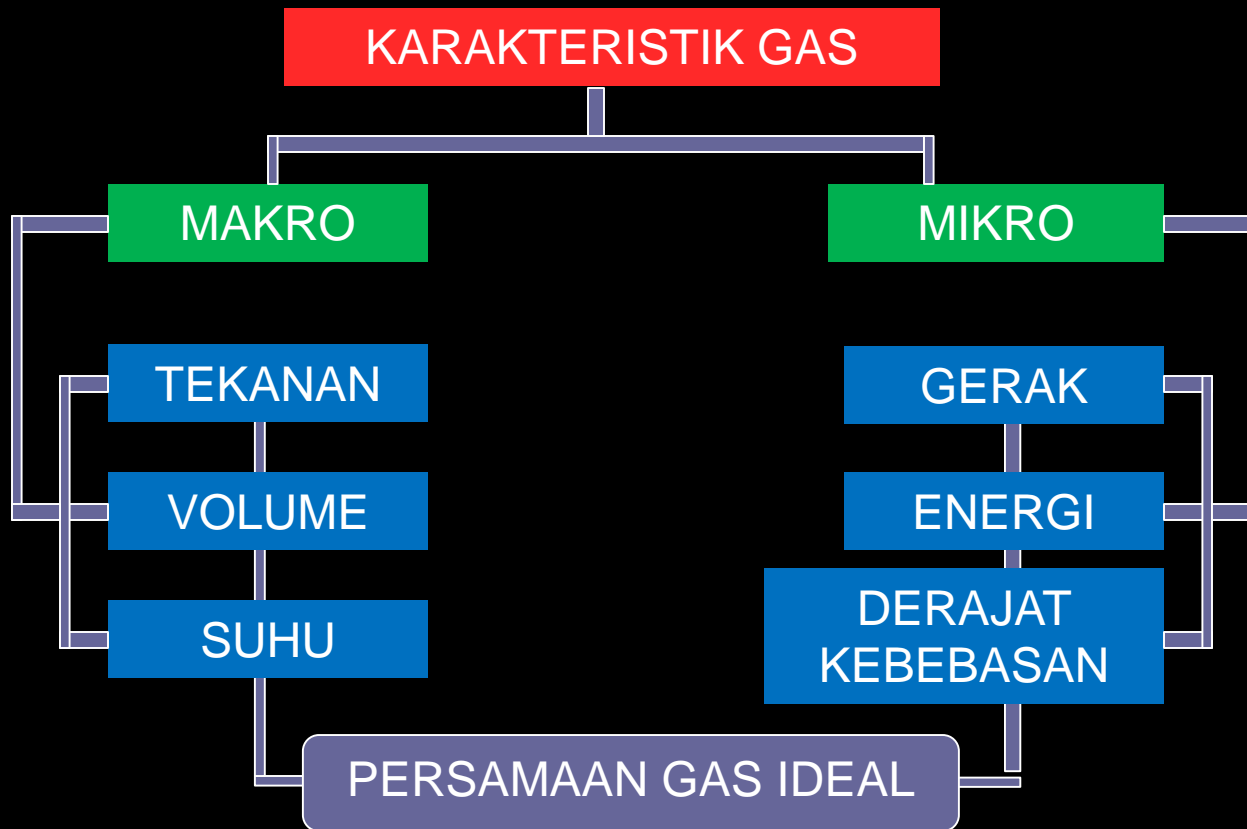
- 3.8 Memahami teori kinetik gas dan menjelaskan karakteristik gas pada ruang tertutup

# *Indikator :*

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- Mendiskripsikan hubungan suhu dan volume gas dalam ruang tertutup
- Mendiskripsikan hubungan tekanan dan suhu gas dalam ruang tertutup
- Menyebutkan karakteristik Gas Ideal
- Mendiskripsikan perilaku partikel gas dalam ruang tertutup
- Menjelaskan faktor yang mempengaruhi besar Energi Dalam partikel gas

# PETA KONSEP



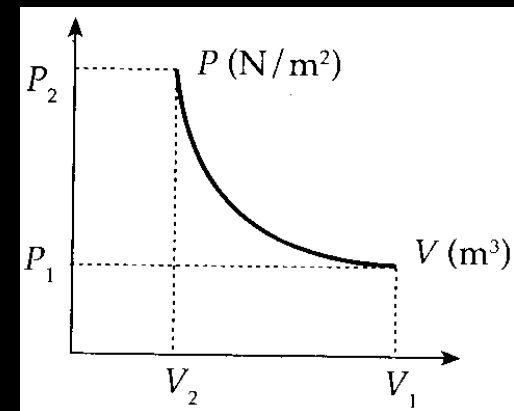
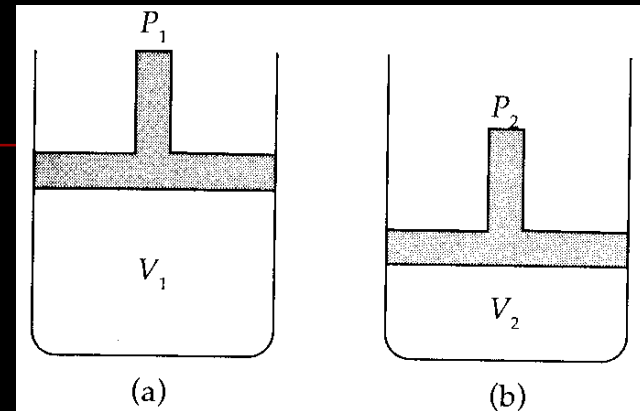
# Boyle's Law

- If the temperature of gas in a container is maintained constant, the gas pressure is inversely proportional to its volume.

- $P_1 V_1 = P_2 V_2$

- P : Gas Pressure ( N/m<sup>2</sup> or Pascal)

- V : Gas Volume (m<sup>3</sup>)



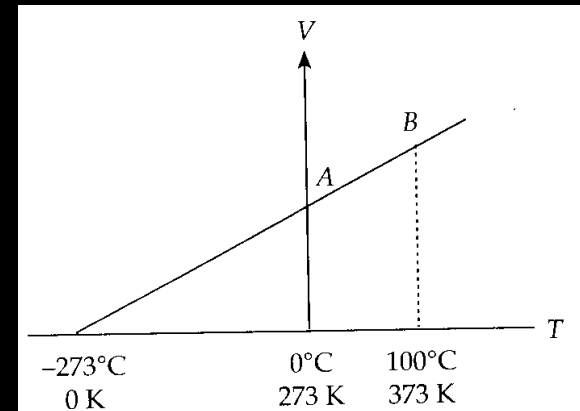
# Gay Lussac's Law

- If the pressure in an enclosed container is maintained constant, the volume (V) of gas is proportional to its absolute temperature (T)

V : volume (m<sup>3</sup>)

T : Absolute Temperature (K)

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



# Boyle – Gay Lussac's Law

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- In an enclosed container, with mass of gas constant :

- $$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad \text{or} \quad \frac{PV}{T} = C$$



# Beberapa Asumsi tentang Gas Ideal

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- Gas tersusun atas partikel-partikel yang jumlahnya sangat banyak yang disebut molekul
- Molekul gas bergerak acak dan memenuhi hukum-hukum Newton tentang gerak
- Ukuran molekul gas dapat diabaikan dibanding ukuran wadahnya
- Tumbukan antar molekul adalah tumbukan lenting sempurna
- Gaya antar molekul diabaikan.

# General Equation of Ideal Gas

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- $PV/T = nR$

$n$  : number of mole of gas

$R$  : the universal gas constant =  $8.314 \text{ J}/(\text{mol}\cdot\text{K})$

$N = n \cdot N_A$   $N$  : the number of gas particle

$N_A$  : Avogadro's Number =  $6.022 \times 10^{23} \text{ Particle/mol}$

$n = N/N_A$  and  $R/N_A = k = \text{Boltzmann Constant } (1.38 \times 10^{-23}) \text{ J/K}$

$n = M/M_r$  ;  $M_r$  : relative mass of molecule

in a form that includes quantity of the number of gas particle ( $N$ ) the general equation of ideal gas can be written as :

- $PV/T = Nk$

# Student Activity #1

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- In an enclosed container 4 litre gas at pressure of 4 atm and temperature of  $47^{\circ}\text{C}$ , at certain time, the pressure is changed become  $\frac{1}{4}$  from its initial, and the temperature is maintained at its initial value, Determine the volume !

# Student Activity #2

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- A cylindrical pump contains oxygen gas at temperature of 373 K and pressure of 20 atm. At certain time, the piston is pushed down in a way that its volume become 50 liters. As a result, the temperature of gas increases 300 K. what is the current pressure given that the volum of cylinder is 100 liter :

# Student Activity #3

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- Gas in enclosed container with volume of 1 liter, at pressure of 10 atm and temperature of 47°C. If the gas is warmed at constant pressure so its temperature become 77°C. Determine its volume !

# Student Activity #4

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- Oxygen Gas at temperature of  $27^{\circ}\text{C}$  and pressure of  $10^5$  Pa has volume of 30 liter. Determine the volume of the oxygen given that the pressure become  $2.5 \times 10^5$  Pa and the temperature becomes  $127^{\circ}\text{C}$

# Student Activity #5

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- A rubber balloon with volume of 20 liter is filled with oxygen at pressure of 135 atm and temperature of 27°C. Determine the oxygen mass given that  $R = 8.314 \text{ J}/(\text{mol}\cdot\text{K})$

# Student Activity #6

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- An amount of gas with volume of 600 liter, temperature of  $27^{\circ}\text{C}$  and pressure of 5 atm has mass of 1.95 kg. Determine the relative mass of the gas !



# Student Activity #7

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- One mol gas is placed in a container that has 100 l of volume at a temperature of 127°C. Determine the pressure of the gas !

# Student Activity #8

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- A bubble air at the base of the lake with 44 m of depth has volume of  $1 \text{ cm}^3$ . If the base's temperature is  $5.5^\circ\text{C}$  and the surface temperature is  $21^\circ\text{C}$ . What is the volume of the bubble when its close to the surface ?

# Student Activity #9

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- A wheel is filled with an air at temperature of  $15^{\circ}\text{C}$  and pressure of  $2.2 \times 10^5\text{Pa}$ . If the temperature of the wheel become  $40^{\circ}\text{C}$ . What is the part of the air that exit from the wheel if the pressure is maintained as its initial

# Student Activity #10

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- The density of the gas at temperature of  $T$  and pressure of  $P$  is  $\rho$ , If the pressure of the gas is increases become  $2P$  and the temperature is decreased become  $0.5 T$ , Determine the final density.

# Sistem Satuan

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Apa yang kamu peroleh dengan mengerjakan secara berkelompok ?

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Apa peran ponsel anda dalam mengerjakan tugas tadi ?

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