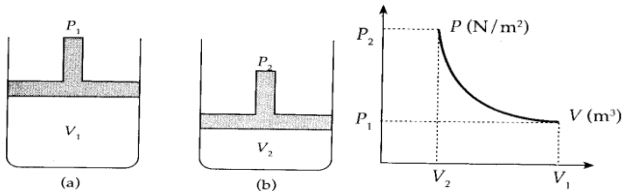# Teori Kinetik Gas

Hukum Boyle :

Dalam ruang yang tertutup dengan temperatur yang dijaga tetap, tekanan gas berbanding terbalik dengan volume ruang :
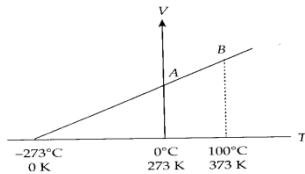
$$P_1 V_1 = P_2 V_2$$

Hukum Gay Lussac

Dalam ruang tertutup dengan tekanan yang dijaga konstan, volume gas sebanding dengan suhu mutlaknya :

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

Dalam grafik ditunjukkan sebagai berikut :

Hukum Boyle Gay Lussac

Dalam ruang tertutup hubungan suhu, volume, dan tekanan dinyatakan dengan :

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

Beberapa Asumsi tentang Gas Ideal
- 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.

Persamaan Gas Ideal

$$\frac{PV}{T} = nR \text{ atau } \frac{PV}{T} = Nk$$

P = Tekanan (Pascal)
V = (m^3)
T = Suhu (Kelvin)
N = Jumlah partikel
n = N/N_A
n = M/M_r ; M_r : relative mass of molecule
N_A = Avogadro's Number = 6.022×10^{23} Particle/mol

R = the universal gas constant = 8.314 J/(mol.K)
k = Boltzmann Constant (1.38×10^{-23}) J/K

Latihan :

1. In an enclosed container 4 litre gas at pressure of 4 atm and temperature of 47^oC, at certain time, the pressure is changed become ¼ from its initial, and the temperature is maintained at its initial value, Determine the volume !

2. 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 :

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

4. Oxygen Gas at temperature of 27^oC and pressure of 10^5 Pa has volume of 30 liter. Determine the volume of the oxygen given that the pressure become 2.5×10^5 Pa and the temperature becomes 127^oC

5. A rubber ballon with volume of 20 liter is filled with oxygen at pressure of 135 atm and temperature of 27^oC. Determine the oxygen mass given that R = 8.314 J/(mol.K)

6. An amount of gas with volume of 600 liter, temperature of 27^oC and pressure of 5 atm has mass of 1.95 kg. Determine the relative mass of the gas !

7. One mol gas is places in an container that has 100 l of volume at temperature of 127^oC. Determine the pressure of the gas !

8. A bubble air at the base of the lake with 44 m of depth has volume of 1 cm^3. If the base's temperature is 5.5^oC and the surface temperature is 21^oC. What is the volume of the bubble when its close to the surface ?

9. A wheel is filled with an air at temperature of 15^oC and pressure of 2.2×10^5Pa. If the temperature of the wheel become 40^oC. What is the part of the air that exit from the wheel if the pressure is maintained as its initial

10. The density of the gas at temperature of T and pressure of P is ρ, If the pressure of the gas is increases become 2P and the temperature is decreased become 0.5 T, Determine the final density.