

GAS LAW T₂

1. a) State Charles' Law.

b) The volume of a sample of nitrogen gas at a temperature of 291 K and 1.0×10^5 pascals was $3.5 \times 10^{-2} \text{ m}^3$. Calculate the temperature at which the volume of the gas would be $2.8 \times 10^{-2} \text{ m}^3$ at 1.0×10^5 pascals (3mks)

2. A fixed mass of gas occupies 200 cm^3 at a temperature of 23°C and a pressure of 740 mmHg .

a) Calculate the volume of the gas at -25°C and 780 mmHg pressure. (3mks)

b) Gas K diffuses through a porous material at a rate of $12 \text{ cm}^3/\text{sec}$ whereas gas S diffuses through the same material at a rate of $7.5 \text{ cm}^3/\text{sec}$. Given the molar mass of K is 16 Calculate the molar mass of gas S. (3mks)

3. a) What is the relationship between the rate of diffusion of a gas and its molecular mass? (1mk)

4. A sample of carbon(IV) oxide takes 200 seconds to diffuse across a porous plug. How long will it take the same amount of carbon(II) oxide to diffuse through the same plug. (C=12 O=16)

5. A gas occupies 5 dm^3 at a temperature of -27°C and 1 atmosphere pressure. Calculate the volume occupied by the gas at a pressure of 2 atmospheres and a temperature of 127°C .

6. a) 100 cm^3 of carbon (iv) oxide gas diffuses through a porous partition in 30 seconds. How long would it take 150 cm^3 of nitrogen (iv) oxide to diffuse through the same partition under the same conditions ($C=12$ $N=14$ $O=16$). (3mks)

b) The molar masses of gases W and X are 16.0 and 44.0 respectively. If the rate of diffusion of W through a porous material is $12\text{ cm}^3/\text{sec}$, Calculate the rate of diffusion of X through the same material. (2mks)

7. A sealed glass tube containing air at s.t.p was immersed in water at 100°C . Assuming that there was no increase in the volume of the glass tube due to the expansion of the glass, Calculate the pressure of the inside tube. (3mks)

8. a) Sketch a graph that represent Charles' Law.

b) A gas occupies a volume of 250 cm^3 at -23°C at 1 atmosphere. Determine its volume at 127°C when pressure is kept constant.

9. A gas has a volume of 0.2 dm^3 at s.t.p. Calculate the volume the gas would occupy at a pressure of 1.0135×10^5 pascals and 127°C .

10. A fixed mass of a gas has a volume of 200 cm^3 and a pressure of 101325 pascals. What would be its volume at -23°C and at 100,000 Pascals?

11. Calculate the mass of nitrogen (IV) oxide gas that would occupy the same volume as 10g of hydrogen gas at the same temperature and pressure.
($N=14$, $O=16$ $H=1$)

12. Calculate the relative formula mass (molar mass) of a gas A given that the time taken for equal volumes of oxygen and gas A to diffuse through the use of the same hole is 20 seconds and 24 seconds respectively.