STATES OF MATTER

ONE MARK QUESTIONS

1. In terms of Charles laws explain why -273°C is lowest possible temperature?

2. Using the equation of state PV=nRT show that at a given temperature, the density of a gas is proportional to pressure.

3. Critical temperature for carbon dioxide and methane are 31.1oC and -81.9oC respectively. Which of theses has stronger intermolecular forces and why?

4. Define Boyle point.

5. Molecule A is twice as heavy as the molecule B. which of these has higher kinetic energy at any temperature?

TWO MARKS QUESTIONS

1. Express the following in the units given in brackets.

   a) 300cm of Hg [atmosphere]   b) 1bar [kPa]

   c) 500000 Pa [bar]d) 450mm of Hg [Pa]

2. What type of intermolecular forces are existing between the following

   HCl and H_2O ii F_2 molecule   iii Br- and H_2O iv CO_2 and ammonia

3. Explain each of the following

   i. Tyres of automobiles are inflated to lesser pressure in summer than in winter

   ii. Glycerin is more viscous than water

4. A gas occupies 0.15dm^3 when collected over water at 15°C and 75cm of Hg. In the dry condition the same gas occupies 0.138dm^3 at NTP. Calculate aqueous tension.

5. 38ml of moist nitrogen gas were collected at 27°C and 746.5mm of Hg. Calculate the volume in ml of the gas at 273K and 101.3kPa pressure.(aq. tension at 27°C = 26.5mm of Hg)

6. The mass of 500cc hydrogen at 760mm of Hg and 300K was found to be 0.0409g. Calculate the molecular mass of hydrogen

7. What will be the pressure of a gaseous mixture containing 4.2 g of nitrogen and 1.6 g of methane in a 5 lt flask at 27°C?

8. At a constant temperature, a certain mass of gas occupies 7.5 lt when the pressure is 800mm of Hg. Calculate the pressure at which the volume of the gas would be decreases by 35% of its initial volume.

THREE MARKS QUESTIONS

1. Calculate the root mean square, average and most probable speeds of chlorine molecule

at 27°C.

2   What do you mean by ideal and real gases? Why do real gases deviate from ideal behaviour? Write Vander Waals equation for real gases.

3   Derive

  i.   The relation between partial pressure of a gas and its mole fraction.

  ii. The ideal gas equation

  iii. Relation between density of a gas and its molar mass

4   A 200cc capacity flask contained oxygen at 200mm and another flask of 300cc capacity contained nitrogen at 100mm pressure. The two flasks were connected so that both gases filled the combined volume. What is the partial pressure of each gas in the final mixture and what is the total pressure.

5   i.   What will be the pressure of a gaseous mixture containing 4.2 g of nitrogen and 1.6 g of methane in a 5 lt flask at 27°C?

  ii. The density of a gas was found to be 1.56g/lt at 745mm of Hg and 65°C. Calculate its molecular mass

6   i.   The density of a gaseous oxide at 2 bar is the same as that of nitrogen gas measured at 5 bar at a given temperature. Find the molar mass of the oxide.

  ii. Calculate the volume occupied by 0.5 moles of CO_2 at -25^{0}C and 760mm pressure. [At STP volume is 22.7 lt/mole]

7   i.   The temperature of a given mass of air was reduced from 15^{0}C to -15^{0} C. If the initial volume of air was 100ml, what would be its new volume if pressure is maintained a constant?

  ii. At a certain temperature, a certain mass of gas occupies a volume of $5dm^{3}$ when the pressure is 540mm of Hg. Calculate the pressure in atmosphere when the volume is reduces to 1.5 dm^{3} at the same temperature

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