D. A surface is hit elastically and normally by n molecules per unit time. All the agasta. I

- having the same mass and are moving with the same velocity 'u'. The force on 1. State the important postulates of kinetic theory of gases. Derive an expression for the pressure exerted by a gas. C. G. Super (CVI) D. Super C.
- 2. Derive expressions for (a) rms velocity and (b) kinetic energy of a molecule of a gas,
- 3. Discuss briefly the Maxwellian speed distribution. From this obtain expression for mean velocity, rms velocity and most probable velocity of the molecules of a gas,

If he pressure in a closed vessel is reduced by drawing our some ga

E. Problems

1. Calculate the rms velocity of methane molecules present in the atmosphere of Jupiter whose atmospheric temperature is -130° C. Molecular mass of methane = 16; E. increases or decreases depending on the nature of the gas X^{1-1} lom X^{1-1}

ideal gas at pressure P and temperature T occupies a volume of 1 little. 2. If the rms velocity of hydrogen molecule at STP is 1.84×10^3 ms⁻¹, calculate the rms velocity of oxygen at STP [Molecular mass of hydrogen and oxygen are 2 and 32 respectively].

ream 064: sanA] choice questions

- 3. Calculate the kinetic energy of 0.002 kg of helium at 200 K. $R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$ PA (21) A (41) A [Ans: 1.245 × 103]
- 4. At what temperature, the pressure remaining constant, will the r.m.s. velocity of a gas be half its value at 273 K? 8. Very short answer questions

[X25.86 arms] the kinetic interpretation of pressure exerted by a gas? American with the

5. The mean kinetic energy of a molecule of hydrogen at 0° C is 5.64 $\times 10^{-21}$ J and R = $8.3 \,\mathrm{J}\,\mathrm{mol}^{-1}\,\mathrm{K}^{-1}$. Calculate Avogadro number. 3. State the law of equipartition

[Ans: $6.023 \times 10^{23} \text{ mol}^{-1}$]

mber? Explain. 6. At what temperature will the average speed of oxygen molecules be sufficient to escape from the earth? Given escape velocity of earth = 11.1 kms⁻¹, mass of oxygen molecule = 5.34×10^{-26} kg, $k = 1.38 \times 10^{-23}$ JK⁻¹

[Hint: $(3/2) kT = \frac{1}{2} \text{ mv}_e^2$]

[Ans: $1.6 \times 10^5 \,\text{K}$]

7. Calculate the temperature at which the rms velocity of gas molecules is double the value at 27°C, pressure remaining constant. ussaid to noissaid so at guint

near free parts' of the molecule of a gas? Give an expression for it. 8. Given Boltzmann's constant = $1.38 \times 10^{-23} \, \mathrm{JK}^{-1}$ calculate the kinetic energy of translation of an oxygen molecule at 300 K

[Ans: 6.21×10^{-21}]

of molecules? Give reason for your answer. 9. At what temperature is the rms speed of an atom of argon gas equal to the rms speed of a helium gas atom at -20°C2 (Atomic man of argon gas equal to the rms speed of a helium gas atom at -20° C? (Atomic mass of Ar = 39.9 u, of He = 4.04)

Hint: $\sqrt{T_1/M_1} = \sqrt{T_2/M_2}$

[NCERT] [Ans: 2.52×10^{3} k] Mention the postulates of Kinetic Theory of gabes.