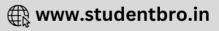
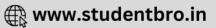
		Alexandre and	Sec. Sec.
-	Kinetic theory of Gases		
	Introduction: Ly John Dalton cliscovered at orn in 1803 Ly Kinetic theory in 1873		Avg
	Atoms/molecules constantly moves		(0110) (m
	Given by Maxwell & Boltzmann		IDE
	Assumption:	[1	
	i) Intermolecular Force is absent in ideal gases * We study ang properties of gases		
	Mean Free Path: Aug. distance travelled by a molecule b/w 2 successive coll ⁿ s.		P
	b/w 2 successive collins.		
	0 10		н.g
<u> </u>	$\lambda m = \lambda_1 + \lambda_2 + \dots - + \lambda n$		Ga
			<u>P</u>
R HAR A			

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classmate Avg relaxation time (T) Avg Lime period b/w & successive COLLOS. Tm= I1+ Te + - - - - Tn IDEAL GAS Laws: I Boyle's law: (1661) At, constant temp of gas, [isothermal. -* Low/theoreotical. $T_0 > T_1 > T_2$ High temp: (Real das -> ideal das) Gras lans agrees experiment. $P_1 V_1 = P_2 V_2 = constant$ Soonnad by ComSoonna

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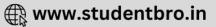
(intel) classmate Date Page 1783: Charles Law + mitaki I) 1.11 0 At constant P SAVA VAT 1 1 1 2 1 N A + ideal gas ga 5 T n E for all gases At high temp, law holds - constant NI 0 = N2 Ta × en! Boyle's davo Charles Low Na Va-D T= constants P= constant. 1:10:01 NX P PN = constant PINI Ti Pav2 T2

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Potm = 1m + m = 1.01 × 10⁵ N m² classmate Dote_ Page_ Pour $\frac{1}{2} + \frac{1}{2} + \frac{1}$ Q • P=3Sh + Patro 40m Air bubble PINI = P2N2 $\frac{P_1N_1}{T_1} = \frac{P_2N_2}{T_2}$ 1 00 (1.01×1050+103×10×40)×1cm3=(1.01×105)×12 285 300 - 105 XY2 500 105+4×105 285 $10^{5}(5)$ - 300 V2 5 qcm³ = V2

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	Sing and Carry and Carry
)	Avogadro's hypothesis (1811)
	At constant T & P: Equalized vol of all gases contains equal no of molecules.
	NX no. of molecules (P\$T-constant) NX no. of moles
	I deal Gas Equation?
	Nal Nat Nan Propriese and the second of the
	$\frac{N \alpha pT}{P}$ $\frac{V = R pT}{P}$
	PV = nRT Where
- //	<u>p=Pressure</u> <u>N=Nol</u> ^m
- //w	R= Gasconstant : 8.314 5/molix. T= Temperature) [In kelvin] n= no of moles.



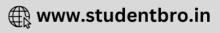
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classmate Dete Page I ded gas 1 Ta Real Gas T1>T2 PN RT P Real gas => I deal gas FLOW TempPressure High Temp 1 mole of any Gus: PV = RT i deal PV - 1 (LOW P& HighT) Gas RT Hightemp M real gas & ideal gas get closer 10⁻³ kg of Oz I deal gas ALall pressure fall Temp R= 3.14 J/molt C PN PY - ? P where autyaxis.

			1
	Contraction and the	Inside	
	r		
		chesante	and the second
		Pagn (*	
	Annual Contraction of		
	Alexandren and a second se	PV - P	The second second
	Name of the second s		0
		PV = nRT	Q
		PN - NR	and the second second second
		In = mass R	
		molarmass	
		$n = 10^{-3} k_{0}^{6} \times 8.514$	
		32 0	
		= 16, 8.314 . 535 = 0.25.	
		. 325	te fan en de en selet en sen annan te
		- 0.25	
		For what mass of H2 gas the Nature: of PN will be same as PN for 10 - Rob F 02001 T	
		T will be same as PV for 10 Rob F 02001	
		$PN = D_{4}RT$ $PN = D_{4}RT$	
	_ 11	(PV) - (PV)	
		$(T)_{02} - (T)_{H_2}$	
		$n_{0}R = n_{R}R$	
		$muss or o_2$ $muss vr H$	
		molar mass o2 molar mass 42	
		$molar musso2 molar muss u2 10^{-3} kg' = 2e 1632g' - 2e \frac{1.}{16} \sqrt{10^{5}} kg' - 2e$	
	R. I.	$\frac{10^{-3} \text{ kg}}{16 \text{ gag}} = \frac{2\ell}{12 \text{ gg}}$	
- Service		1. x105Kd - 2	
		16 .	
	-		-
	and the amount of the second	$\frac{2}{16} = \frac{100}{16} \times 10^{-5} \times 6$	1
		$= 6.25 \times 10^{-5} \text{ kg}$	-
		$m_{H_2} = 6.25 \times 10^{25} \text{kg}$	1
			-
Silver 1	A CONTRACTOR OF		

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Streete C Find the ratio of molecular vol? 0 by 02 molecules. (diameter of 02 molecule is 3A°. 1 mole of 02 at STP = 22.4L = 22.4×10-3 m3 - Molecular volm - 4/27713 x6022×1023 Actual volm occupied 22.4 × 10-3 m3

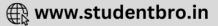
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(intel classifie Kinetic Theory of Galses? Postulates: i] Gas is made up of atoms \$ molecules. ii] molecules of same gases are identical in all respects. (mass, shape, size) iii) Molecules are constanly in random motion along straight line. Wy ' AL --- > llre :) WK U= Uxi + Uyi + Ux R. $\frac{11}{2} = \frac{11}{12} = \frac{11}{12}$ = 111 12 = 1122+142+ 112= 3422 themselves & mall of container is elustic in nature Momentum John 1035 Kinetic energy of molecules with wall of container. pano. of coll's of molecules per unit Soonnad by ComSoonna

classmate vij The kinetic energy of gas depends only \$ only upon temp Cabsolute) (doesn't depend on nature of gas) negligible when compared to volm of Qas. Nof 0 0 molécules 605 KSK There inno inter molecular force of viii] attraction attraction among molecules. ix] Gravity is neglected. Kinetic gas equis * $= \frac{1}{3} mn Mrm^2$ PNI m- mass of one molecule of gas n-> no, of molecules Urms-> Root mean square velocity of molecules n-> no, of molecules - u2 $U_{rmS} = \sqrt{\frac{u_{1}^{2} + \frac{u_{2}^{2}}{n_{1}^{2} + \frac{u_{1}^{2}}{n_{2}^{2} + \frac{u_{1}^{2}}{n_{1}^{2} + \frac{u_{1}^{2}}{n_{2}^{2} + \frac{u_{1}^{2}}{n_{1}^{2} + \frac{u_{1}^{2}}{n_{1}$ KEOFN moles = NX 3 RT of gas Soonnad by ComSoonna

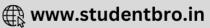
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classmate Date 5 41211 : tomariant 1 7 Nat 1 1.96 R EUZ 1131 919d" m noi bon the Ť ٢ 2 11 05 Pi= muzi Pf = - m Uzi AP = 2 muxi 21 time taken for Ux, each coll? AP Maine Force exerted ALS on wall -RMUXI F 5 &1 Unime F 2 m Uzi 4 5 X 6 2 8 3 10 10 10

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descente. $\frac{* u = u_x \hat{i} + u_y \hat{j} + u_x \hat{k}}{u^2 = 3u_x^2}$ i des F \mathcal{U}_1^2 = 1 3 $F' due to one - m M_{\chi^2}$ $\frac{m}{1} \frac{1}{3} \frac{1}{3}$ Ξ molecule F due to "n" molecules: $= 1 \underbrace{m}_{3} \underbrace{m}_{1} \underbrace{m}_{2} \underbrace{m}_{3} \underbrace{m}_{1} \underbrace{m}_{1}$ $\frac{U_1^2 + U_2^2 + \dots - \dots - U_n^2}{n}$ Fnet = YD 1 m 3 1 no Urms Fnet= 1 3 mn Urms mp llins Pressure= F mourns Kinetic Gas ea = 3 mn Urms PV = 13 Conned by Comeconner

PALENRT Cleasurete Duste 0.0821 atm 1/mile KIR S PI F/mot K Kinetic energy : $K \cdot E = \frac{1}{2} M \mu^2$ K.E of n molecules = $\frac{1}{2}mU_i^2 + \frac{1}{2}mU_b^2 + \frac{1}{2}mU_b^2$ = $\frac{1}{2}m(\frac{10^2 + 10^2 + 10^2}{2} + \frac{10^2}{2})$ K.E of n molecules = $\frac{1}{2}mU^2rms\chi$ 1/2 mail ins yr K.E V3 murms DN 3 K.E 04 3 pu for 1 mole KIE of gus(ideal) [PV: PT K.E SRT -2 PVI= 1 mD Nims K.E of Imple - 3 RT afridad one 21 of rideol gas massof 00.0F Gas constant 1 molecule malecules 8.314 J/molk Soonnad by Componna 🕀 www.studentbro.in

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R - Baltzmann constant Obele O NA K.E of n moles of ideal = $ny \frac{3}{2} RT$ KEOF <u>3 RT</u> <u>8 KT</u> 1 molecule 2 NA 2 1 Boltzman constant K=1.38 × 10-23 J/K Find out KE of 8g of CHz at 27°C. K.E=nx3 RT [n0.of = mass] 2 [moles molarmass] = 0.5x3 x 8314x300 J = 8 - 0.5] 2 [16] T 92] Find out K.E of 1 molecule of $oxygen(0_2)$ gas at 127°C. -7 K.E = 3 KT 2 $= \frac{3}{2} \times 1.38 \times 10^{-23} \times 400$ = 600 × 1.38 × 10⁻²³ J 1.5 Conned by Com Conner CLICK HERE Get More Learning Materials Here : 📕 🕀 www.studentbro.in

273 classmate Q.3Find the change in K.E. of 1 mole of ideal gas when temp changes by 50°C KEF-KE; DK.E= 20 - <u>3 RT</u>, RT, 3R KEI=3 (7+50) 3 R AKE -K.E; KEF = 3 R[T+50-2 = <u>3</u> RX50 2 = <u>s</u> R 8.314 X 50 T At what temp, the KE mill be half of its K.E. nx3x Rx400 KIET K.E 127°C -MX3/ RXT = MX3/2 XRX400 = LOOK d by Com Soonno

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1amu = 4.1.67×10-27 kg classmate Short cut REX T THIPS <u>Ø5</u> -Hegas molecules They make 500 coll's with the NALL in each sec. + CIS 2cm Find the temp. Time For locoll = 1 \$... time taken for Icolling 29 Ulimons $\frac{1}{500} - \frac{20}{Mrms}$ $\frac{1}{1} - \frac{200}{200} - \frac{200}{Mrms}$ $\frac{1}{1000} - \frac{200}{Mrms}$ 500 = Mrms= m 20m/s K.EOF _ 1 M.Urms 1 molocula 2 moleule : <u>3 ki</u> Implearle - 4gmy of He = 4x1.67x10⁻²⁷kg 1 muims = 3 KT Soonnad by Com Soonnar

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= M NA) (Imoleurle) elacemate molar RMIS Velocity Root Mean Square NIN N3 VI $N_{1}^{2} + N_{2}^{2} + N_{3}^{2} + - - - + N_{n}$ 2 NRMS = n NRMS= (m/s) 3RT m R= 8.314 J/mol K 11/ 2 Y T=in Kelvin Massie molermass of gas (inko) M_{12} 0-TD: 03 $\frac{K \cdot E_{Total} = 1}{2} \frac{m v_{1}^{2} + 1}{R} \frac{m v_{2}^{2} + 1}{R}$ --+1m N12+122+ --- Vn2 m 2 5 Nrm3 n 2 K.E of Imole 1 mrms -XNA 2 of gas ÷ NS RT Myrms 12 -Vrms? 2 11 ko Connod hu

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classimate Date Page G. NRMS For H2 molecules at 27°C. VRMS 3RT M 3×8.314×300 R×10-3 3 ×4 × 300×103 V 36×105 V3.6×106 _ -1.3×103 if VRMS for H2 is 2 at a given Q Temp. Find NEMS FOR 0, at given Temp. Noa Ξ 1M027 MH2 VH2 3RT MH2 - 7 2710-3-32×10-3 1-16 Noz De 102 20 1 11 Conned by Com Conner

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(Intel) Inside PENTIU VRMS XVT classinate Vrms of O2 at T (inkelvin). Find Q At 20 Vrms H2 Vrms 02 3RT 3127 MO2 MH 300 Q1X10-3 33,210-3 300 1 300 1 T 16 4800K 20001 Ta = . ł. 13.151 Pressure ۳. VRMIS =1 3RT (SI uni+) m Derivation K.E of 1 mole of Gas = MYcms² 12 BRAT= 10 MINIMS C 2 3 PV = MYrms hiel Nrms = W/SPV (MV) 1. 3 Pater Conned by Comeconner

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Siccuste At constant termp >1 Nrms = constants. PT Maxwell's distribution of velocities Area of - Total dN oraph no.a dN 11 maleuler Fraction of molecules VMP Most probable velocity Speced of molecules CV \leq NMP = ZRT M BRT NRMS M SRT Your C. ΠM (veluin) Navo = 0 > MR>A NEMS> NAVE > NMP Soonnad by Com Soonna

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classmate Date Mean Free Paths On 1st page. 12 Mean free path is avorage distance b/10 + wo consecutive coll's. Amean= ALTA2t ---- An n 0/1 \$20 d 1m no of molecules per unit volm = x 1m3 = 20 2m³=22 Vom³ = N2C - Cont In ξ. no of molecules inside cylinder = TI(d) XI XE no of coll's in 1 m travelling - TI(d)? 2 distrince

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LISSMACE. TId² re collⁿs m distance 1 distance TId22 1 $\lambda =$ 7 = R TIDAR d2PNA 20-> no of molecules per unit vol DRT PN = P 1 RT N n = x NA R PNA R-Soonnad by Com Soonnar

