

PYQSide

NEET KINETIC THEORY — PYQS

Max. Marks: 116

Questions: 29

Section A (MCQ)

- Q.1** A flask contains argon and chlorine in the ratio of 2 : 1 by mass. The temperature of the mixture is 27°C . The ratio of root mean square speed of the molecules of the two gases $\left(\frac{V_{\text{rms}}^{\text{Ar}}}{V_{\text{rms}}^{\text{Cl}}}\right)$ is :

(Atomic mass of argon = 40.0 u and molecular mass of chlorine = 70.0 u) [NEET (UG) 2026]

- (1) $\frac{7}{4}$ (2) $\frac{2}{\sqrt{7}}$ (3) $\frac{\sqrt{7}}{2}$ (4) $\frac{7}{2}$

Scan or tap for the full solution



- Q.2** An ideal gas is made of polyatomic molecules. Each of the molecules has three translational, three rotational and f number of vibrational modes. If the ratio of heat capacities C_p/C_v of the gas is $8/7$, then the value of f is: [RE-NEET (UG) 2026]

- (1) 1 (2) 4 (3) 3 (4) 2

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- Q.3** The mean free path of molecules in an ideal gas A is half that of another ideal gas B. The diameter of the spherical molecules of gas A is twice the diameter of the molecules of B. If number densities of the gases A and B are n_A and n_B , respectively, the correct option is: [RE-NEET (UG) 2026]

- (1) $n_A = \frac{1}{2}n_B$ (2) $n_A = n_B$
(3) $n_A = 2n_B$ (4) $n_A = \frac{1}{4}n_B$

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- Q.4** A container has two chambers of volumes $V_1 = 2$ litres and $V_2 = 3$ litres separated by a partition made of a thermal insulator. The chambers contain $n_1 = 5$ and $n_2 = 4$ moles of ideal gas at pressures $p_1 = 1$ atm and $p_2 = 2$ atm, respectively. When the partition is removed, the mixture attains an equilibrium pressure of [NEET (UG) 2025]

- (1) 1.4 atm (2) 1.8 atm (3) 1.3 atm (4) 1.6 atm

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- Q.5** An oxygen cylinder of volume 30 litre has 18.20 moles of oxygen. After some oxygen is withdrawn from the cylinder, its gauge pressure drops to 11 atmospheric pressures at temperature 27°C . The mass of the oxygen withdrawn from the cylinder is nearly equal to:

[Given, $R = \frac{100}{12} \text{ J mol}^{-1} \text{ K}^{-1}$, and molecular mass of $\text{O}_2 = 32$, 1 atm pressure = $1.01 \times 10^5 \text{ N/m}^2$]

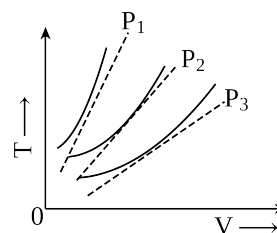
[NEET (UG) 2025]

- (1) 0.116 kg (2) 0.156 kg
(3) 0.125 kg (4) 0.144 kg

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- Q.6** The following graph represents the T-V curves of an ideal gas (where T is the temperature and V the volume) at three pressures P_1 , P_2 and P_3 compared with those of Charles's law represented as dotted lines.



Then the correct relation is : [NEET (UG) 2024]

- (1) $P_3 > P_2 > P_1$ (2) $P_1 > P_3 > P_2$
(3) $P_2 > P_1 > P_3$ (4) $P_1 > P_2 > P_3$

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- Q.7** According to the law of equipartition of energy, the number of vibrational modes of a polyatomic gas of constant $\gamma = \frac{C_p}{C_v}$ is (C_p and C_v are the specific heat capacities of the gas at constant pressure and constant volume, respectively):

[RE-NEET (UG) 2024]

- (1) $\frac{4+3\gamma}{\gamma-1}$ (2) $\frac{3+4\gamma}{\gamma-1}$ (3) $\frac{4-3\gamma}{\gamma-1}$ (4) $\frac{3-4\gamma}{\gamma-1}$

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- Q.8** The temperature of a gas is -50°C . To what temperature the gas should be heated so that the rms speed is increased by 3 times? [NEET (UG) 2023]
 (1) 3295°C (2) 3097 K (3) 223 K (4) 669°C

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- Q.9** The volume occupied by the molecules contained in 4.5 kg water at STP, if the intermolecular forces vanish away is [NEET (UG) 2022]
 (1) $5.6 \times 10^6\text{ m}^3$ (2) $5.6 \times 10^3\text{ m}^3$
 (3) $5.6 \times 10^{-3}\text{ m}^3$ (4) 5.6 m^3

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- Q.10** Three vessels of equal capacity have gases at the same temperature and pressure. The first vessel contains helium (monoatomic), the second contains fluorine (diatomic) and the third contains sulfur hexafluoride (polyatomic). The correct statement, among the following is : [NEET (UG) 2022 (Phase 2)]
 (1) The root mean square speed of sulfur hexafluoride is the largest
 (2) All vessels contain unequal number of respective molecules
 (3) The root mean square speed of molecules is same in all three cases
 (4) The root mean square speed of helium is the largest

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- Q.11** Match **Column - I** and **Column - II** and choose the correct match from the given choices.

[NEET (UG) 2021]

Column - I		Column - II	
A.	Root mean square speed of gas molecules	P.	$\frac{1}{3}n\bar{v}^2$
B.	Pressure exerted by ideal gas	Q.	$\sqrt{\frac{3RT}{M}}$
C.	Average kinetic energy of a molecule	R.	$\frac{5}{2}RT$
D.	Total internal energy of 1 mole of a diatomic gas	S.	$\frac{3}{2}k_B T$

- (1) (A) - (R), (B) - (Q), (C) - (P), (D) - (S)
 (2) (A) - (R), (B) - (P), (C) - (S), (D) - (Q)
 (3) (A) - (Q), (B) - (R), (C) - (S), (D) - (P)
 (4) (A) - (Q), (B) - (P), (C) - (S), (D) - (R)

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- Q.12** The average thermal energy for a mono-atomic gas is : (k_B is Boltzmann constant and T absolute temperature) [NEET (UG) 2020]
 (1) $\frac{3}{2}k_B T$ (2) $\frac{5}{2}k_B T$ (3) $\frac{7}{2}k_B T$ (4) $\frac{1}{2}k_B T$

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- Q.13** The mean free path for a gas, with molecular diameter d and number density n can be expressed as : [NEET (UG) 2020]

- (1) $\frac{1}{\sqrt{2}n\pi d^2}$ (2) $\frac{1}{\sqrt{2}n^2\pi d^2}$
 (3) $\frac{1}{\sqrt{2}n^2\pi^2 d^2}$ (4) $\frac{1}{\sqrt{2}n\pi d}$

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- Q.14** A cylinder contains hydrogen gas at pressure 249 kPa and temperature 27°C . Its density is : ($R = 8.3\text{ J mol}^{-1}\text{ K}^{-1}$) [NEET (UG) 2020]

- (1) 0.2 kg/m^3 (2) 0.1 kg/m^3
 (3) 0.02 kg/m^3 (4) 0.5 kg/m^3

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- Q.15** Increase in temperature of a gas filled in a container would lead to : [NEET (UG) 2019]
 (1) increase in its kinetic energy
 (2) decrease in intermolecular distance
 (3) decrease in its pressure
 (4) increase in its mass

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- Q.16** At what temperature will the rms speed of oxygen molecules become just sufficient for escaping from the Earth's atmosphere?
 (Given : Mass of oxygen molecule (m) = $2.76 \times 10^{-26}\text{ kg}$, Boltzmann's constant $k_B = 1.38 \times 10^{-23}\text{ J K}^{-1}$) [NEET 2018]
 (1) $2.508 \times 10^4\text{ K}$ (2) $8.360 \times 10^4\text{ K}$
 (3) $5.016 \times 10^4\text{ K}$ (4) $1.254 \times 10^4\text{ K}$

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- Q.17** A gas mixture consists of 2 moles of O_2 and 4 moles of Ar at temperature T . Neglecting all vibrational modes, the total internal energy of the system is [NEET 2017]
 (1) $15 RT$ (2) $9 RT$ (3) $11 RT$ (4) $4 RT$

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- Q.18** The molecules of a given mass of a gas have r.m.s. velocity of 200 m s^{-1} at 27°C and $1.0 \times 10^5 \text{ N m}^{-2}$ pressure. When the temperature and pressure of the gas are respectively, 127°C and $0.05 \times 10^5 \text{ N m}^{-2}$, the r.m.s. velocity of its molecules in m s^{-1} is

[NEET 2016 (Phase 1)]

- (1) $\frac{100\sqrt{2}}{3}$ (2) $\frac{100}{3}$
(3) $100\sqrt{2}$ (4) $\frac{400}{\sqrt{3}}$

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- Q.19** A given sample of an ideal gas occupies a volume V at a pressure P and absolute temperature T . The mass of each molecule of the gas is m . Which of the following gives the density of the gas?

[NEET 2016 (Phase 2)]

- (1) $P/(kT)$ (2) $Pm/(kT)$ (3) $P/(kTV)$ (4) mkT

Scan or tap for the full solution



- Q.20** Two vessels separately contain two ideal gases A and B at the same temperature, the pressure of A being twice that of B. Under such conditions, the density of A is found to be 1.5 times the density of B. The ratio of molecular weight of A and B is

[AIPMT 2015]

- (1) 2 (2) $\frac{1}{2}$ (3) $\frac{2}{3}$ (4) $\frac{3}{4}$

Scan or tap for the full solution



- Q.21** 4.0 g of a gas occupies 22.4 litres at NTP. The specific heat capacity of the gas at constant volume is $5.0 \text{ J K}^{-1} \text{ mol}^{-1}$. If the speed of sound in this gas at NTP is 952 m s^{-1} , then the heat capacity at constant pressure is (Take gas constant $R = 8.3 \text{ J K}^{-1} \text{ mol}^{-1}$)

[AIPMT 2015]

- (1) $7.0 \text{ J K}^{-1} \text{ mol}^{-1}$ (2) $8.5 \text{ J K}^{-1} \text{ mol}^{-1}$
(3) $8.0 \text{ J K}^{-1} \text{ mol}^{-1}$ (4) $7.5 \text{ J K}^{-1} \text{ mol}^{-1}$

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- Q.22** The ratio of the specific heats $\frac{C_p}{C_v} = \gamma$ in terms of degrees of freedom (n) is given by

[AIPMT 2015 (Cancelled)]

- (1) $\left(1 + \frac{2}{n}\right)$ (2) $\left(1 + \frac{n}{2}\right)$
(3) $\left(1 + \frac{1}{n}\right)$ (4) $\left(1 + \frac{n}{3}\right)$

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- Q.23** The mean free path of molecules of a gas, (radius r) is inversely proportional to

[AIPMT 2014]

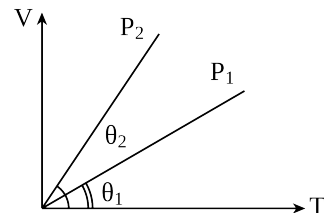
- (1) r^3 (2) r^2 (3) r (4) $\sqrt{r}$

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- Q.24** In the given ($V - T$) diagram, what is the relation between pressure P_1 and P_2 ?

[NEET 2013]



- (1) $P_2 < P_1$ (2) Cannot be predicted
(3) $P_2 = P_1$ (4) $P_2 > P_1$

Scan or tap for the full solution



- Q.25** The amount of heat energy required to raise the temperature of 1 g of Helium at NTP, from $T_1 \text{ K}$ to $T_2 \text{ K}$ is

[NEET 2013]

- (1) $\frac{3}{4} N_A k_B (T_2 - T_1)$ (2) $\frac{3}{4} N_A k_B \left(\frac{T_2}{T_1}\right)$
(3) $\frac{3}{8} N_A k_B (T_2 - T_1)$ (4) $\frac{3}{2} N_A k_B (T_2 - T_1)$

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- Q.26** In a vessel, the gas is at pressure P . If the mass of all the molecules is halved and their speed is doubled, then the resultant pressure will be

[NEET 2013 (Karnataka)]

- (1) $2P$ (2) P (3) $P/2$ (4) $4P$

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- Q.27** At 10°C the value of the density of a fixed mass of an ideal gas divided by its pressure is x . At 110°C this ratio is

[AIPMT 2008]

- (1) $\frac{10}{110}x$ (2) $\frac{283}{383}x$ (3) x (4) $\frac{383}{283}x$

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- Q.28** The equation of state for 5 g of oxygen at a pressure P and temperature T , when occupying a volume V , will be

(where R is the gas constant) [AIPMT 2004]

- (1) $PV = (5/32)RT$ (2) $PV = 5RT$
(3) $PV = (5/2)RT$ (4) $PV = (5/16)RT$

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- Q.29** To find out degrees of freedom, the expression is

[AIPMT 2000]

(1) $f = \frac{2}{\gamma - 1}$

(2) $f = \frac{\gamma + 1}{2}$

(3) $f = \frac{2}{\gamma + 1}$

(4) $f = \frac{1}{\gamma + 1}$

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full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	2	1	4	1	4	3	1	4	4	4
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	1	1	1	1	2	3	4	2	4	3	1
Ques.	23	24	25	26	27	28	29				
Ans.	2	1	3	1	2	1	1				