Q.1 The factor $\frac{R}{N_A}$ in an ideal gas law is

(A) Celsius constant **(B)**Characteristic gas constant

(C) Universal gas constant **(D)**Boltzmann's constant

Q.2 A storage tank contains 2 moles ofAr, 3 moles of O_2, 5 moles ofN_2. If volume of tank is$1m^3$, find the total pressure exerted by mixture of gases at300 K?

(A)29442 N/m^2 **(B)**22000 N/m^2 **(C)** 21000 N/m^2 **(D)**23500 N/m^2

Q.3 Which of the following differentiate between diffusion andeffusion?

(A) Diffusion is the intermixing of the gas molecules at any direction and effusion is the reverse of diffusion.

(B) Diffusion is the property of the gas molecules and effusion is the property of the gas container only.

(C) Diffusion occurs at any direction, whereas effusion occurs under the potential difference.

(D) Diffusion is the intermixing of the gas molecules due to concentration gradient, whereas effusion is the escaping of gas molecules through the pores without collision.

Q.4 The rate of diffusion of two gases A and Bis in the ratio of 1: 2 and the B and C in the ratio1: 8, the rate of diffusion of Cwith respect to A is

(A)1; 12 **(B)** 12 **(C)** 1; 16 **(D)** 16

Q.5 The time taken for a certain volume of gas to diffuse through a small hole was2 min. Under similar conditions an equal volume of oxygen took 4 min to pass. The molecular mass of the gas is

(A) 32.0 g **(B)** 16.0 g **(C)** 8.0 g **(D)** 4.0 g

Q.6 Under which of the following condition is the law PV = nRT obeyed most closely by a real gas?

(A) High pressure and high temperature

(B) Low pressure and low temperature

(C) Low pressure and high temperature

(D) High pressure and low temperature

Q.7 In Van der Waal's equation of state of the gas, the constant 'b' is a measure of

(A) Intermolecular collisions per unit volume. **(B)**Intermolecular attraction.

(C) Volume occupied by molecules. **(D)**Intermolecular repulsions.

Q.8 The value of 'a' in Van der Waal's equation for the gases O_2,N_2, NH_3 and CH_4 are 1.35, 1.38, 4.16and 2.25 Respectivelythe gas which can most easily be liquefied is

(A)0_2 **(B)** N_2 **(C)** NH_3 **(D)** CH_4

Q.9 1 mole of real gas (a = 1.4) occupies a volume of 0.1 L at300 K, then what will be the pressure of gas?

(A) 2460 atm **(B)** 2320 atm **(C)** 106 atm **(D)** 212 atm

Q.10 In the processPV = constant, pressure (P) versus density (ρ), graph of an ideal gas is

(A)A straight line parallel to P-axis **(B)** a straight line parallel to ρ-axis

(C) An inclined straight line passing through the origin **(D)** a parabola

WORKSHEET

Relative Motion

Q.1 A train is running at a speed of72 km/hr. A boy runs inside the train in same direction (as that of train) with a speed of 10 km/hr with respect to the train. Find the velocity of boy as seen from the ground

(A)62 km/hr Along the direction of motion of train

(B)72 km/hr Opposite to direction of motion of train

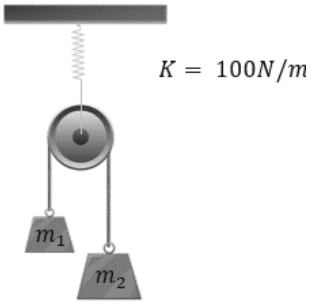
(C) 82 km/hr Along the direction of motion of train

(D) None of these

Pulley mass system

Q.2 For the given system, find the extension in the spring if$m_1 = 4$ kg and $m_2 = 6$ kg. Take$g10\ m/s^2$.

(A)0.96 m **(B)**0.86 m **(C)** 0.48 m **(D)**0.24 m



Vertical circular Motion

Q.3 What is the velocity of the bob of a simple pendulum at its mean position, if it is able to rise to a maximum vertical height of40 cm.$\left(\text{Take}\, g = 9.8\ \frac{m^2}{s}\right)$

(A) 1.4 m/s **(B)** 0.7 m/s **(C)** 2.8 m/s **(D)** 3.6 m/s

Centre of mass

Q.4 A heavy uniform chain lies on the top of horizontal table. If the coefficient of static friction between the chain and the table surface is0.2, then the maximum fraction of the length of Th chain that can be hung over one edge of the table is:

(A)$\frac{L}{6}$ **(B)**$\frac{L}{3}$ **(C)** $\frac{L}{2}$ **(D)**$\frac{L}{4}$

$W_x = m_x g$

Rotational Motion

Q.5 Find the speed of uniform solid sphere after rolling down (without sliding) an inclined plane of vertical height $h = 0.14$ m from rest is $\left(\text{Take}\, g = 9.8\ m/s^2\right)$

(A) 1.4 m/s **(B)** 1.2 m/s **(C)**1 m/s **(D)** 1.3 m/s

Young's Modulus

Q.6 Two wires are made of the same material and have the same volume. The first wire has a cross – sectional are 1 mm^2 and the second wire has cross – sectional area4 mm^2. If the length of the first wire is increased by ΔL on applying a force of10 N, how much force is needed to stretch the second wire by the same amount?

(A)160 N **(B)**100 N **(C)** 90 N **(D)**80 N

Pascal's law

Q.7 A downward force of 100 N is applied to the small piston with a diameter of 50 cm in the hydraulic lift system as shown in figure. What will be the upward force exerted on the large position with a diameter of1 m?

(A) 300 N **(B)** 50 N **(C)**400 N **(D)** 600 N

Equation of continuity

Q.8 Water flows through a horizontal pipe with a cross – sectional area of 2 m^2 at a speed of 5 m/s with a pressure of 3×10^5Pa at a pointA. At pointB, the cross – sectional area is 1 m^2. Calculate the pressure at pointB.

(A)5×10^5 Pa **(B)**2.625×10^5 Pa **(C)** 3×10^4 Pa **(D)**1.5×10^5 Pa

Surface tension

Q.9 A drop of liquid of diameter 2.8 mm break up into 216 identical drops. What is the approximate change in energy of bigger drop?(Given: Surface tension of liquid, T = 75 dyne/cm)

(A)25π erg **(B)**29.4π erg **(C)** 32π erg **(D)**28π erg

Conversion of temperature

Q.10 The reading of a centigrade thermometer coincides with that of Fahrenheit thermometer for a liquid. The temperature of the liquid $(\text{in } C^\circ)$ is

(A)$-40^\circ C$ **(B)**$0^\circ C$ **(C)** $100^\circ C$ **(D)**$300^\circ C$

Ideal gas

Q.11 At higher pressure, which one of the following is correct?

(A) $V_{real} > V_{ideal}$ **(B)** $V_{real} < V_{ideal}$ **(C)** $V_{real} = V_{ideal}$ **(D)** None of these

Partial pressure of gas

Q.12 A closed vessel contains a mixture of one mole of oxygen (O_2) and two moles of Nitrogen (N_2)at300 K. Find the ratio of partial pressure exerted by O_2 to the total pressure exerted

(A)1 ; 3 **(B)**3 ; 1 **(C)** 2 ; 3 **(D)**1 ; 2

Ideal gas

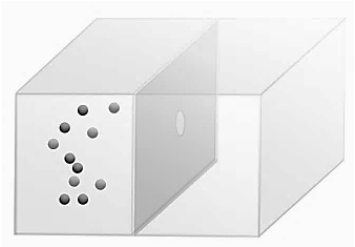
Q.13 A gas flushes out of a container through a pin hole four times quickly as methane. The molecular weight of thegas is

(A) 2 g **(B)**1 g **(C)** 16 g **(D)** 8 g

Mixture of gases

Q.14 Density ratio of O_2 and H_2 is16 : 1. The ratio of their rate of effusion under same conditions is

(A)4: 1 **(B)**1: 4 **(C)** 1: 2 **(D)** 2: 1



Ideal gas

Q.15 A gas has a density of 3 g/L at S.T.P. What is its molar mass?

(A)67.02 g **(B)**40 g **(C)** 20.4 g **(D)**10 g

Mixture of gases

Q.16 2 moles of gas A effuses from a container in10 min. How many moles of gas B would effuse through the same container is same time under similar conditions. Ratio of specific gas constant for gas A to the gas B is 1: 16

(A)2 **(B)**1 **(C)** 4 **(D)**8

Van der Waal's equations

Q.17 Pressure exerted by 1 mole of methane in 0.25 litre container at 300 K using Van der Waal's equations? Given $a = 2.25\ atm - L^2/mol$ $b = 0.05\ L/mol$

(A)86 atm **(B)** 87.15 atm **(C)** 100 atm **(D)** 59 atm

$T = 300k$
$a = 2.25\ atm - L^2/mol$
$b = 0.05\ L/mol$

Ideal gas

Q.18 An ideal gas cannot be liquefied because

(A) Its critical temperature is always above $0^{\circ}C$.

(B) Its molecules are relatively smaller in size.

(C) It solidifies before becoming a liquid.

(D) Forces operating between its molecules are negligible.

Ideal gas

Q.19 The lowest pressure (the best vacuum) that can be created in laboratory at 20°C is 10^{-10} mm of Hg. At this pressure, the number of ideal gas molecules per cm^3 will be

(A) 3.22×10^{12} **(B)** 1.61×10^{10} **(C)** 3.22×10^{8} **(D)** 3.29×10^{6}

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(D)	(A)	(A)	(A)	(C)	(C)	(C)	(C)	(C)	(C)
WORK SHEET										
Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(A)	(C)	(A)	(A)	(A)	(C)	(B)	(B)	(A)
Q.	11	12	13	14	15	16	17	18	19	
Sol.	(A)	(A)	(B)	(B)	(A)	(D)	(B)	(D)	(D)	