Chapter 17

Kinetic Theory of Gases-

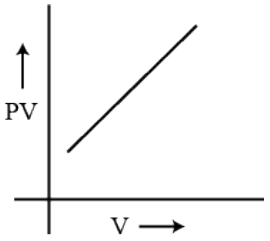
Q.1 The temperature of gas is due to
(A) The potential energy of its molecules
(B) The kinetic energy of its molecules
(C) The attractive force between its molecules
(D) The repulsive force between its molecules

Q.2 Which one of the following is not an assumption of kinetic theory of gases?
(A) The volume occupied by the molecules of the gas is negligible
(B) The force of attraction between the molecules is negligible
(C) The collision between the molecules are elastic.
(D) All molecules have same speed

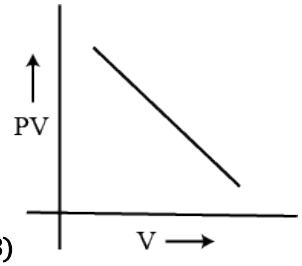
Q.3 By what percentage should the pressure of a given mass of a gas be increased so as to decrease its volume by 20% at a constant temperature?
(A) 20% **(B)** 25% **(C)** 10% **(D)** 5%

Q.4 Which one of the graph represents the behavior of an ideal gas at constant temperature?

(A)



(B)



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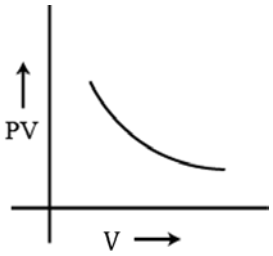

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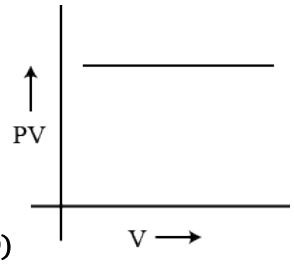


Q.5 When temperature of an ideal gas is increased from 27°C to 227°C keeping its mass and pressure Constant, then volume of the gas will be increased
(A) 33.33% **(B)** 66.66% **(C)** 30% **(D)** 60%

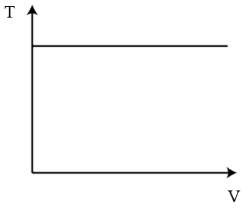
Q.6 At absolute zero temperature, the volume of an ideal gas

(A) Becomes zero **(B)** Becomes maximum

(C) Is not defined **(D)** none of these

Q.7 Which one of the following graph represents the behavior of a ideal gas? Assume pressure is constant.

(A)



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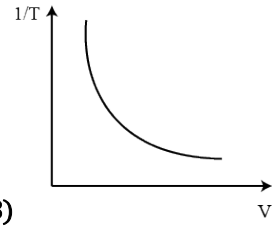
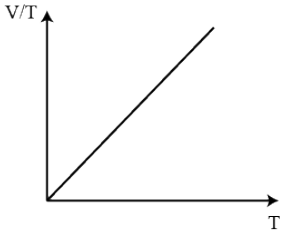


(C)



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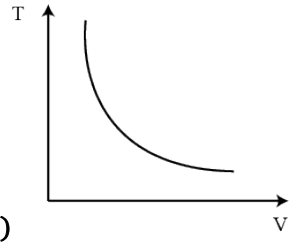


Q.8 At what temperature under constant volume, the pressure of a gas is double to that at 0°C?

(A) 273 K **(B)** 546°C **(C)** 273°C **(D)** 136.5°C

Q.9 Two balloons are filled, one with pure He gas and other by air. If the pressure and temperature of these balloons are same, then the number of molecules per unit volume is:

(A) More in the He filled balloon. **(B)** Same in both the balloons.

(C) More in the air filled balloon. **(D)** In the ratio of1 : 4.

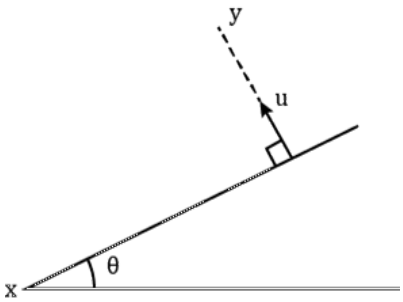
Q.10 Two containers A and B contain the same ideal gas at the same temperature and pressure. If volume of container A is twice the volume of container B, then find the ratio of gas molecules present in container A to container B.

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

WORKSHEET

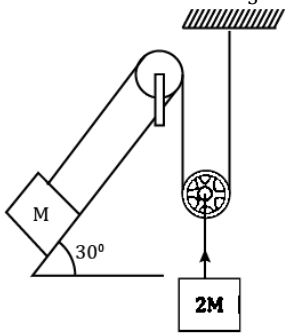
Q.1 A ball is projected perpendicularly from an inclined plane of inclination θ from horizontal, with velocity 'u' as shown in figure. The time after which the projectile is making angle 45° with the inclined plane is

(A) $\frac{u}{g\sin\theta}$ **(B)** $\frac{u}{g\cos\theta}$ **(C)** $\frac{u}{g(\sin\theta+\cos\theta)}$ **(D)** $\frac{u}{g(\sin\theta-\cos\theta)}$



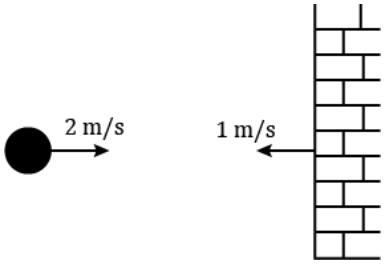
Q.2 As shown in figure, all the surfaces are frictionless and the pulleys and the string are light. The magnitude of acceleration of block 2M is

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



Q.3 A ball is moving with velocity 2 m/s towards a heavy wall approaching the ball with a speed 1 m/s as shown in figure. Assuming collision to be elastic, find the velocity of the ball immediately after the collision. (Considering the initial direction of motion of ball to be +ve).

(A) −2 m/s **(B)** −4 m/s **(C)** 1 m/s **(D)** −3 m/s



Q.4 The centre of mass of a system of particles (arranged in a straight line) is at the origin. From this we conclude that

(A) The number of particles on positive x- axis is equal to the number of particles on negative x- axis

(B) The total mass of the particles on positive x- axis is same as
The total mass on negative x- axis

(C) The number of particles on x- axis should be equal to the number of particles on y- axis.

(D) If there is a particle on the positive x- axis, there must be at least one particle on the negative x- axis.

Q.5 The radius of gyration of a uniform rod of length L about an axis passing through its centre of mass is

(A) $\frac{L}{2\sqrt{3}}$ **(B)** $\frac{L^2}{12}$ **(C)** $\frac{L}{\sqrt{3}}$ **(D)** $\frac{L}{\sqrt{2}}$

Q.6 When a block of mass 2 kg is suspended by a long wire of length 1 m, the length of wire becomes 1.02 m. The elastic potential energy stored in wire is (Take $g = 10\ m/s^2$)

(A) 0.1 J **(B)** 0.2 J **(C)** 0.4 J **(D)** 0.8 J

Q.7 A cube floats in water with $\left(\frac{1}{4}\right)^{th}$ part outside the surface of water. If it floats in another liquid of relative density $\frac{4}{3}$ with xth part outside the liquid, then the value of x is

(A) $\frac{7}{16}$ **(B)** $\frac{1}{2}$ **(C)** $\frac{8}{15}$ **(D)** $\frac{9}{16}$

Q.8 A thin, rectangular film of liquid is extended from (2 cm × 3 cm) to (4 cm × 6 cm). If the work done in the process is 6×10^{-4} J, the value of surface tension of the liquid is

(A) 0.133 N/m **(B)** 0.33 N/m **(C)** 0.166 N/m **(D)** 0.12 N/m

Q.9 If difference of pressure between inside and outside of the spherical drop is 70 N/m^2, then what is the radius of spherical drop? Given: Surface tension of water is 70×10^{-3} N/m.

(A) 1 mm **(B)** 2 mm **(C)** 0.2 mm **(D)** 0.1 mm

Q.10 Calculate Reynold's number if a fluid having a viscosity of 0.25 $N.s/m^2$ and density of 800 kg/m^3 flows through a pipe of radius 10 mm with a velocity of 2 m/s.

(A) 120 **(B)** 128 **(C)** 132 **(D)** 114

Q.11 If the intermolecular forces vanish away, the volume occupied by the molecules contained in 4.5 kg water at STP will be

(A) 5.6 m^3 **(B)** 4.5 m^3 **(C)** 11.2 m^3 **(D)** 5.6 litres

Q.12 Which of the following methods will enable the volume of an ideal gas to be made four times greater? (Consider absolute temperature)

(A) Quarter the pressure at constant temperature
(B) Quarter the temperature at constant pressure
(C) Half the temperature,double the pressure
(D) Double temperature, double the pressure

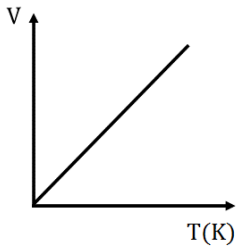
Q.13 If a given mass of gas occupies a volume of 10 cc at 1 atm pressure and temperature 100°C. What will be its volume at 4 atm, the temperature being the same?

(A) 104 cc **(B)** 2.5 cc **(C)** 400 cc **(D)** 10 cc

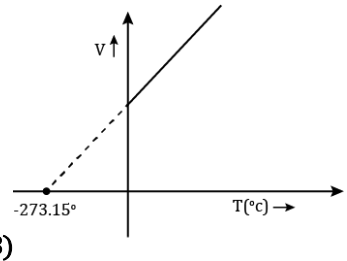
Q.14 1000 cc of an ideal gas at constant pressure is heated from 27°C to 327°C.The new volume will be

(A) 1500 cc **(B)** 2000 cc **(C)** 1000 cc **(D)** 750 cc

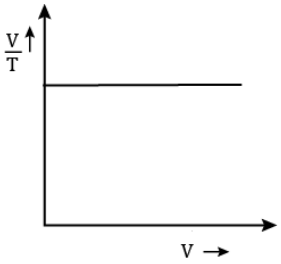
Q.15 Which one of the following graphs represents the behavior of an ideal gas of given mass at constant pressure?



(A)



(B)



(C)

(D) All of these

Q.16 A given volume of air at 37°C exerts a pressure of 870 mm of mercury. The temperature at which the pressure becomes 1740 mm of Hg is

(A) 200 K **(B)** 305 K **(C)** 620 K **(D)** 310 K

Q.17 A gas at temperature 250 K is contained in a closed vessel. If the gas is heated and the temperature rises by 1°C, the percentage increase in its pressure is nearly

(A) 0. 4% **(B)** 0.6% **(C)** 0.8% **(D)** 1.0%

Q.18 You are given sample of 1 cm^3 of H_2, 1 cm^3 of O_2 and 1 cm^3 of Cl_2 which are at STP. The sample which has maximum number of molecules is

(A) H_2 **(B)** O_2 **(C)** Cl_2 **(D)** All have same value

Q.19 A vessel has 6 g of hydrogen at pressure P and temperature 500 K. A small hole is made in it so that hydrogen leaks out. How much hydrogen leaks out if the final pressure is P/2 and temperature falls to 300 K?

(A) 2 g **(B)** 3 g **(C)** 4 g **(D)** 1 g

Q.20 Two gases A and B having same pressure P, volume V and temperature T are mixture. If the mixture has volume and temperature as V and T respectively, then the pressure of the mixture will be

(A) 4P **(B)** 3P **(C)** 2P **(D)** P

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(A)	(D)	(B)	(D)	(B)	(A)	(B)	(C)	(B)	(A)
WORK SHEET										
Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(B)	(B)	(D)	(A)	(B)	(A)	(C)	(B)	(B)
Q.	11	12	13	14	15	16	17	18	19	20
Sol.	(A)	(A)	(B)	(B)	(D)	(C)	(A)	(D)	(D)	(C)