CHEMISTRY

VMC MODULES ENGLISH

STATES OF MATTER

Fundamental

1. Helium gas at 300 K is shifted from a vessel of $250 cm^3$ to a vessel of 1 L capacity. The pressure of gas will

A. become double

B. becomes four times

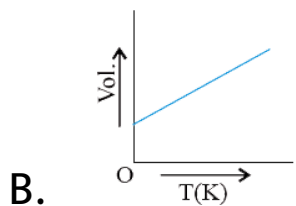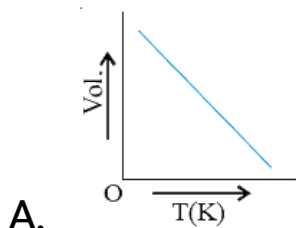C. decrease to half of the original value

D. decrease to one-fourth of the original value

Answer: D

▶ Watch Video Solution

2. The correct representation of Charle's law is given in

A.

B.

C.

D.

Answer: C

3. Which of the following does not show the relationship between Boyle's law and Charles' law?

A. $\dfrac{P_1}{P_2}$

B. $PV = K$

C. $\dfrac{P_2}{P_1} = \dfrac{V_1}{V_2}$

D. $\dfrac{V_2}{V_1} = \dfrac{P_1}{P_2} \times \dfrac{T_2}{T_1}$

Answer: D

4. A cylinder is filled with a gaseous mixture containing equal masses of CO and N_2. The partial pressure ratio is:

A. $P_{N_2} = P_{CO}$

B. $P_{CO} = 0.875 P_{N_2}$

C. $P_{CO} = 2 P_{N_2}$

D. $P_{CO} = 0.5 P_{N_2}$

Answer: A

5. Which of the following gases will have the highest RMS velocity at $25°C$?

A. Oxygen

B. Carbon dioxide

C. Sulphur dioxide

D. Carbon monoxide

Answer: D

6. The value of van der Waals constant a is the maximum for

    A. chlorine

    B. hydrogen

    C. nitrogen

    D. helium

Answer: A

▶ **Watch Video Solution**

7. Which of the following is correct decreasing order of r.ms. velocity at same temperature for H_2, N_2, CO_2 and O_2

A. $O_2 > CO_2 > N_2 > H_2$

B. $H_2 > N_2 > O_2 > CO_2$

C. $H_2 > N_2 > CO_2 > O_2$

D. $N_2 > CO_2 > H_2 > O_2$

Answer: B

▶ **Watch Video Solution**

8. The kinetic energy of one mole of any gas depends upon

    A. pressure of the gas

    B. nature of the gas

    C. volume of the gas

    D. absolute temperature of the gas

Answer: D

▶ **Watch Video Solution**

9. The ratio of most probable velocity, average velocity and root mran square velocity is

A. $\sqrt{2} : \sqrt{\dfrac{8}{\pi}} : \sqrt{3}$

B. $1 : \sqrt{2} : \sqrt{3}$

C. $\sqrt{2} : \sqrt{3} : \sqrt{8}$

D. $1 : \sqrt{8\pi} : \sqrt{3}$

Answer: A

▶ **Watch Video Solution**

10. Collision frequency (Z) of a gas at a particular pressure

    A. decreases with the rise in temperature

    B. increases with the rise in temperature

    C. decreases initially and thereafter increases

    D. unpredictable

Answer: B

▶ **Watch Video Solution**

11. The critical temperature of a substance is

A. the temperature above which the substance decomposes

B. the temperature above which a substance can exist only as a gas

C. melting point of the substance

D. boiling point of the substance

Answer: B

▶ Watch Video Solution

12. Dalton's law of partial pressure will not apply to which of the following mixture of gases

    A. H_2 and SO_2

    B. H_2 and Cl_2

    C. H_2 and CO_2

    D. CO_2 and Cl_2

Answer: B

▶ Watch Video Solution

13. The value of van der Waals constant a for the gases O_2, N_2, NH_3, and CH_4 are 1.360, 1.390, 4.170, and $2.253 L^2 atm mol^{-2}$, respectively. The gas which can most easily be liquefied is

A. O_2

B. N_2

C. NH_3

D. CH_4

Answer: C

14. Kinetic energy and pressure of a gas of unit volume are related as:

A. $P = \dfrac{2}{3}E$

B. $P = \dfrac{3}{2}E$

C. $P = \dfrac{1}{2}E$

D. $P = 2E$

Answer: A

15. For the given ideal gas equation $PV = nRT$, answer the following questions:

An ideal gas will have maximum density when

A. P=0.5 atm, T = 600K

B. P=2 atm, T = 150K

C. P=1 atm, T = 300K

D. P=1.0 atm, T = 500K

Answer: B

16. If pressure becomes double at the same absolute temperature on $2LCO_2$, then the volume of CO_2 becomes

    A. 2L

    B. 4L

    C. 5L

    D. 1L

Answer: D

17. If $20cm^3$ gas at $1atm$ is expanded to $50cm^3$

at constant T, then what is the final pressure

A. $20 \times \dfrac{1}{50}$

B. $50XX\dfrac{1}{20}$

C. $1XX\dfrac{1}{20}XX50$

D. None of these

Answer: A

18. A 10 g of a gas at atmospheric pressure is cooled from $273°C$ to $0°C$ eeping the volume constant, its pressure would become

A. 1/2 atm

B. 1/273 atm

C. 2 atm

D. 273 atm

Answer: A

19. Pure hydrogen sulphide is stored in a tan

of 100 litre capacity at $20°C$ and 2 atm

pressure. The mass of the gas will be

A. 34 g

B. 340 g

C. 282.4 g

D. 28.24 g

Answer: C

20. How many moles of He gas occupy 22.4

litres at $30°C$ and one atmospheric pressure

A. 0.9

B. 1.11

C. 0.11

D. 1

21. Volume of 0.5 mole of a gas at 1 atm. pressure and $273°C$ is

    A. 22.4 litres

    B. 11.2 litres

    C. 44.8 litres

    D. 5.6 litres

Answer: A

22. Pressure of a mixture of 4 g of O_2 and 2 g

of H_2 confined in a bulb of 1 litre at $0°C$ is

A. 25.215 atm

B. 31.205 atm

C. 45.215 atm

D. 15.210 atm

Answer: A

---

23. At S.T.P., the density of nitrogen monoxide is

A. $3.0 g L^{-1}$

B. $30 g L^{-1}$

C. $1.3 g L^{-1}$

D. $2.68 g L^{-1}$

Answer: C

24. A gaseous mixture contains 56 g of N_2 , 44 g CO_2 and 16 g of CH_4 The total pressure of the mixture is 720 mm Hg. The partial pressure of CH_4 is

A. 180mm

B. 360mm

C. 540 mm

D. 720mm

Answer: A

▶ **Watch Video Solution**

25. Equal weights of ethane and hydrogen are mixed in an empty container at $25°C$. The fraction of the total pressure exerted by hydrogen is :

A. $1:2$

B. $1:1$

C. $1:16$

D. $15:16$

Answer: D

▶ **Watch Video Solution**

26. A gas diffuses at a rate which is twice that of another gas B. The ratio of molecular weights of A to B is

A. 1

B. 0.75

C. 0.5

D. 0.25

Answer: D

▶ **Watch Video Solution**

---

27. The kinetic energy for 14 g of nitrogen gas

at $127°C$ is nearly (mol. Mass of nitrogen = 28

and gas constant = 8.31 J/mol K)

A. 1.0 J

B. 4.15 J

C. 2493 J

D. 3.3 J

Answer: C

▶ Watch Video Solution

28. The densities of two gases are in the ratio

of 1:16. The ratio of their rates of diffusion is

A. $16:1$

B. $4:1$

C. $1:4$

D. $1:16$

Answer: B

▶ Watch Video Solution

29. The average kinetic energy of an ideal gas per molecule in SI unit at $25°C$ will be:

A. $6.17 \times 10^{-21} kJ$

B. $6.17 \times 10^{-21} J$

C. $6.17 \times 10^{-20} J$

D. $7.16 \times 10^{-20} J$

Answer: B

▶ **Watch Video Solution**

---

30. At certain temperature, the r.m.s. velocity

for CH_4 gas molecules is 100 m/sec. This

velocity for SO_2 gas molecules at same temperature will be

A. 400 m/sec

B. 200 m/sec

C. 50 m/sec

D. 25 m/sec

Answer: C

▶ **Watch Video Solution**

31. The temperature of 20 litres of nitrogen was increased from 100 K to 300 K at a constant pressure. Change in volume will be

A. 80 litre

B. 60 litre

C. 40 litre

D. 20 litre

Answer: C

32. 10 g of a gas at NTP occupies a volume of 2 litres. At what temperature will the volume be double, pressure and amount of the gas remaining same?

    A. 273 K

    B. 546K

    C. $-273^\circ C$

    D. $546^\circ C$

Answer: B

▶ **Watch Video Solution**

33. If 1 litre of N2 at $27°C$ and 760 mm Hg contains N molecules, 4 litres of O_2 under the same conditions of temperature and pressure, shall contain

A. N molecules

B. 2N molecules

C. $\dfrac{N}{4}$ molecules

D. 4N molecules

Answer: D

34. Two gases A and B, having the mole ratio of 3 : 5 in a container, exert a pressure of 8 atm. If A is removed, what would be the pressure due to B only, temperature remaining constant?

A. 1 atm

B. 2 atm

C. 4 atm

D. 5 atm

Answer: D

▶ **Watch Video Solution**

35. If 1 litre of a gas A at 600 mm and 0.5 litre of gas B at 800 mm are taken in a 2-litre bulb, the resulting pressure is

A. 1500mm

B. 1000 mm

C. 200mm

D. 500mm

Answer: D

▶ **Watch Video Solution**

36. Two grams of dihydrogen diffuse from a container in 10 minutes. How many gram of dioxygen would diffuse through the same

container in the same time under similar conditions?

A. 0.5g

B. 4g

C. 6g

D. 8g

Answer: D

37. The root mean square speed of gas molecules at a temperature $27K$ and pressure 1.5 bar is $1 \times 10^4 cm/\sec$ If both temperature and pressure are raised three times calculate the new rms speed of gas molecules .

A. $9 \times 10^4 cm/s^2$

B. $3 \times 10^4 cm/s$

C. $\sqrt{3} \times 10^4 cm/s$

D. $1 \times 10^4 cm/s$

Answer: C

38. Which of the following choice (s) is (are) correct for a gas?

A. $P_{ideal} > P_{real}$

B. $V_{ideal} = V_{real}$

C. $P_{ideal} < P_{real}$

D. $V_{ideal} < V_{real}$

Answer: A and D

39. A 10 litre gas is inserted into a car tyre at 4 atm and $27°C$. The temperature of tyre increase to $57°C$ during driving. What would be the pressure of gas during driving?

A. 3.1 atm

B. 4.4 atm

C. 300mmHg

D. 2270 mmHg

Answer: B

40. A gas will approach ideal behaviour at

    A. Low temperature and low pressure

    B. High temperature and low presssure

    C. High temperature and high pressure

    D. Critical temperature

Answer: B

41. The temperature at which a real gas obeys the ideal gas laws over a wide range of pressure is called

    A. Critical temperature

    B. Boyle's temperature

    C. Inversion temperature

    D. Reduced temperature

Answer: B

42. At very high pressure, the van der Waals equation reduces to

A. $PV = RT - \dfrac{a}{V}$

B. $PV = RT$

C. $PV = RT + Pb$

D. $PV = \dfrac{aRT}{V_2}$

Answer: C

43. According to Charles' law, at constant pressure, 100 ml of a given mass of a gas with $10°C$ rise in temperature will become ($\frac{1}{273}$ = 0.00366)

    A. 100.0366ml

    B. 99.9634ml

    C. 103.66ml

    D. 100.366ml

Answer: C

44. The root mean square velocity of hydrogen at S.T.P.is

    A. $1.8 \times 10^5 \, cm \, \sec^{-1}$

    B. $3.6 \times 10^5 \, cm \, \sec^{-1}$

    C. $1.8 \times 10^{10} \, cm \, \sec^{-1}$

    D. $1.8 \times 10^8 \, cm \, \sec^{-1}$

Answer: A

45. Cooling takes place when real gas expands adiabatically at

    A. Inversion temperature $= \dfrac{2a}{Rb}$

    B. Boyle's temperature $= \dfrac{a}{Rb}$

    C. Critical temperature $= \dfrac{8a}{27Rb}$

    D. None of the above

Answer: A

46. To which of the following mixture Dalton's law of partial pressure is not applicable ?

A. H_2 and He

B. NH_3 and HCl

C. O_2 and H_2

D. N_2 and O_2

Answer: B

47. 0.24 g of a volatile gas , upon vaporisation gives 45 mL vapour at NTP . What will be the vapour density of the substance ? (Density of $H_2 = 0.089$)

A. 95.39

B. 5.993

C. 95.93

D. 59.73

Answer: D

▶ **Watch Video Solution**

48. 50 mL of hydrogen diffuses out through a small hole from a vessel in 20 minutes, time needed for 40 mL of oxygen to diffuse out is:

1) 12 min 2)64 min 3)8 min 4)32 min

A. 12 min

B. 64 min

C. 8min

D. 32 min

Answer: B

▶ Watch Video Solution

49. 50 mL of a gas A diffuse through a membrane in the same time as for the diffusion of 40 mL of a gas B under identical pressure temperature conditions. If the

molecular weight of $A = 64$ that of B would be

A. 100

B. 250

C. 200

D. 80

Answer: A

▶ **Watch Video Solution**

50. The rms speed at NTP of a gas can be calculated from the expression:

A. $\sqrt{\dfrac{3P}{d}}$

B. $\sqrt{\dfrac{3PV}{M}}$

C. $\sqrt{\dfrac{3RT}{M}}$

D. all of the above

Answer: D

1. As the temperature is raised from $20°C$ to $40°C$, the average kinetic energy of neon atoms changes by a factor of which of the following?

A. $\dfrac{1}{2}$

B. 2

C. $\dfrac{313}{293}$

D. $\sqrt{\left(\dfrac{313}{293}\right)}$

Answer: C

2. If both gases (O_2 and He) have same temperature so rate of diffusion of O_2 will be

    A. Four times of He

    B. Two times of He

    C. 0.35 times of He

    D. eighth times of He

Answer: C

3. Which of the following volume-temperature $(V - I)$ plots represents the behaviour of 1mole of an ideal gas at the atmospheric pressure?

A.

B.

C.

D.

Answer: C

> ▶ **Watch Video Solution**

---

4. At $100^\circ C$ and 1 atm, if the density of the liquid water is $1.0 gcm^{-3}$ and that of water vapour is $0.00006 gcm^{-3}$, then the volume occupied by water molecule in 1 L steam at this temperature is:

A. $6cm^3$

B. $60cm^3$

C. $0.6cm^3$

D. $0.06cm^3$

Answer: C

 Watch Video Solution

5. The RMS velocity of hydrogen is $\sqrt{7}$ times the RMS velocity of nitrogen. If T is the temperature of the gas

A. $T(H_2) = T(N_2)$

B. $T(H_2) > T(N_2)$

C. $T(H_2) < T(N_2)$

D. $T(H_2) = \sqrt{7}T(N_2)$

Answer: C

▶ **Watch Video Solution**

6. The compressibility of a gas is less than

unity at STP. Therefore,

A. $V_m > 22.4L$

B. $V_m < 22.4L$

C. $V_m = 22.4L$

D. $V_m = 44.8L$

Answer: B

▶ **Watch Video Solution**

7. At $25°C$ and 730 mm pressure, 380 mL of dry oxygen was collected.If the temperature is

constant, what volume will the oxygen occupy at 760 mm pressure?

A. 365mL

B. 449mL

C. 569 mL

D. 621mL

Answer: A

▶ **Watch Video Solution**

8. The volume of 2.89 g of carbon monoxide at $27^\circ C$ and 0.821 atm pressure is

    A. 0.03L

    B. 3L

    C. 0.3L

    D. 1.5L

Answer: B

9. The critical temperature of water is higher than that of O_2 because the H_2O molecule has .

    A. fewer electrons than O_2

    B. two covalent bonds

    C. V-shape

    D. dipole moment

Answer: D

▶ **Watch Video Solution**

10. An ideal gas obeying kinetic gas equation can be liquefied if :

A. can be liquefied if its temperature is more than critical temperature

B. can be liquefied at any value of T and P

C. can not be liquefied under any value of T and P

D. can be liquefied if its pressure is more than critical pressure

Answer: C

11. Which is the false statement among the following:

    A. Liquids diffuse slowly than gases

    B. During evaporation of liquids, heating is

       always caused

C. Vapour pressure of a liquid increases with rise in temperature

D. Viscosity of liquid decreases with rise in temperature

Answer: B

▶ Watch Video Solution

12. The ratio between the root mean square velocity of H_2 at 50 K and that of O_2 at 800 K is:

A. 4

B. 2

C. 1

D. $1/4$

Answer: C

▶ **Watch Video Solution**

13. The increasing order of effusion among the gases H_2, O_2, NH_3 and CO_2 is

A. H_2, CO_2, NH_3, O_2

B. H_2, NH_3, O_2, CO_2

C. H_2, O_2, NH_3, CO_2

D. CO_2, O_2, NH_3, H_2

Answer: D

▶ **Watch Video Solution**

14. 50 mL of hydrogen diffuses out through a small hole from a vessel in 20 minutes, time

needed for 40 mL of oxygen to diffuse out is:

1) 12 min 2)64 min 3)8 min 4)32 min

A. 12 min

B. 64 min

C. 8min

D. 32 min

Answer: B

15. Two separate bulbs contain ideal gases A and B. The density of gas A is twice that of gas B. The molecular mass of A is half that of gas B. The two gases are at the same temperature. The ratio of the pressure of A to that of gas B is:

    A. 2

    B. $1/2$

    C. 4

    D. $1/4$

Answer: C

16. 3.2 g of oxygen (At. wt. = 16) and 0.2 g of hydrogen (At. wt. = 1) are placed in a $1.12L$ flask at $0°C$. The total pressure of the gas mixture will be

A. 1 atm

B. 4 atm

C. 3 atm

D. 2 atm

Answer: B

17. One litre of a gas weighs 2 g at 300 K and 1 atm pressure. If the pressure is made 0.75 atm, at which of the following temperature will one litre of the same gas weigh 1 gram : 1) 450K 2) 600K 3) 800K 4)900K

A. 450 K

B. 600 K

C. 800 K

D. 900 K

Answer: A

▶ **Watch Video Solution**

18. A real gas most closely approaches the behaviour of an ideal gas at:

A. 1.5 atm and 200 K

B. 1.0 atm and 273 K

C. 0.5 atm and 500K

D. 15 atm and 500K

Answer: C

▶ **Watch Video Solution**

19. A bottle of dry ammonica and a bottle of dry hydrogen choride conncted through a long fube are opened simulaneously at both

ends. The while ammonium chloride ring first

formed will be

A. at the centre of the tube

B. near the hydrogen chloride tube

C. near the ammonia tube

D. throughout the length of the tube

Answer: B

 Watch Video Solution

20. When an ideal gas undergoes unrestrained expansion, no cooling occurs because the molecules:

A. Are above the inversion temperature

B. Exert no attractive forces on each other

C. Do work equal to the loss in kinetic energy

D. Collide without loss of energy

Answer: B

21. Positive deviation from ideal behaviour takes place because of :

A. Molecular interaction between atoms and PV/nRT gt 1

B. Molecular interaction between atoms and PV/nRT lt1

C. Finite size of atoms and PV/nRTgt1

D. Finite size of atoms and PV/nRT lt 1

Answer: C

22. The values of critical pressure (Pc) and critical temperature (Tc) for O_2, Cl_2, H_2 and He are given below. The gas which has smallest value of Vander Waal's constant b'is

A. O_2

B. Cl_2

C. H_2

D. He

Answer: D

▶ **Watch Video Solution**

23. Carbon dioxide and helium are kept in a container at partial pressure of P_{CO_2} and P_{He} at temperature T. A small aperture is made in the wall of the container. It is observed that

both the gases effuse at the same rate. Ratio of $P_{CO_2} : P_{He}$ in the container is

A. $1 : 3 : 33$

B. $2 : 1$

C. $3.33 : 1$

D. $1 : 2$

Answer: C

24. Identify the incorrect statement among the following?

A. Van der Waal's constant 'a' is a measure of intermolecular force of attraction between the molecules.

B. Intermolecular force of attraction increases with the increase in pressure

C. Van der Waal's constant 'a' becomes negligible at high pressure.

D. None of these

Answer: D

▶ **Watch Video Solution**

25. A vessel having certain amount of oxygen at certain pressure and temperature develops a very small hole and 4 g of oxygen effuses out. How much hydrogen would have effused out of the same vessel had it been taken at the same pressure and temperature.

A. 1g

B. 16g

C. 0.25g

D. 64g

Answer: A

▶ **Watch Video Solution**

26. In which of the following two cases more number of grams of gas molecule will hit a unit area in unit time?

(I) H_2 at 1 atm and 50K

(II) O_2 at 2atm and 200K

A. Hydrogen

B. Oxygen

C. Same in both the cases

D. Information is incomplete, hence, it can not be predicted.

Answer: B

 Watch Video Solution

27. One litre of a mixture of CO and CO_2 is passed through red-hot charcoal. The volume now becomes 1.6 litre. Find the composition of the mixture by volume.

A. 0.35

B. 0.4

C. 0.5

D. 0.6

Answer: D

▶ **Watch Video Solution**

28. A balloon filled with ethyne is pricked with a sharp point and quickly dropped in a tank of H_2 gas under identical conditions. After a while the balloon will have

A. shrunk

B. enlarged

C. completely collapsed

D. remains unchanged in size

Answer: B

29. On a certain day the vapour pressure is 14 mm of Hg for water vapour in air at $20°C$. The saturated vapour pressure is 17.5 mm. How many moles of water vapour per litre of air would be required to saturate air at this temperature ?

A. 9.41×10^{-4}

B. 9.14×10^{-4}

C. 1.914×10^{-4}

D. 4.19×10^{-4}

Answer: C

▶ **Watch Video Solution**

30. Two closed vessels of equal volume containing air at pressure P_1 and temperature T_1 are connected to each other through a narrow tube. If the temperature in one of the vessels is now maintained at T_1 and that in

the other at T_2, what will be the pressure in the vessels?

A. $\dfrac{2P_1T_2}{T_1 + T_2}$

B. $\dfrac{2P_1}{T_1 + T_2}$

C. $\dfrac{2P_1T_2}{T_1 + T_2}$

D. none of these

Answer: C

▶ **Watch Video Solution**

31. A box of 1 L capacity is divided into two equal compartments by a thin partition which are filled with 2g H_2 and 16 gCH_4 respectively. The pressure in each compartment is reorded as P atm. The total pressure when partition is removed will be:

   A. P

   B. 2P

   C. P/2

   D. P/4

Answer: A

32. What fraction of air is expelled out if a flask containing V litre gas is heated from $27°C$ to $327°C$?

    A. 0.25

    B. 0.5

    C. 0.75

    D. 0.1

Answer: B

---

33. A balloon of volume 200 litre having ideal gas at 1 atm pressure and at $27°C$, when rises to a height where atmospheric pressure is 380 mm Hg and temperature is $-3°C$, balloon will

    A. Contract

    B. Expand

C. No change in volume of balloon

D. Initially expand and then contract

Answer: B

▶ **Watch Video Solution**

34. 4 moles CO, 5 moles N_2 and 2 mole C_2H_4 are placed in a 5 litre vessel at $27°C$. The ratio of kinetic energy per molecule of CO_2, He and NH_3 is

A. $4:5:2$

B. $5:5:4$

C. $2:4:5$

D. $1:1:1$

Answer: D

▶ **Watch Video Solution**

---

35. 20ml CO was mixed with 50 ml of oxygen and the mixture was exploded. On cooling, the

resulting mixture was shaken with KOH. Find the final gaseous volume

A. 20 ml

B. 30 ml

C. 40 ml

D. 10 ml

Answer: C

▶ **Watch Video Solution**

36. The compressibility factor for H_2 and He is usually

    A. gt1

    B. $= 1$

    C. lt1

    D. Either of these

Answer: A

▶ **Watch Video Solution**

37. The average kinetic energy of an ideal gas per molecule in SI unit at $25°C$ will be:

A. $6.17 \times 10^{-21} J$

B. $6.17 \times 10^{-22} J$

C. $6.17 \times 10^{-20} J$

D. $7.16 \times 10^{-20} J$

Answer: A

▶ Watch Video Solution

38. The rms velocity of CO_2 at temperature T(in Kelvin) is x cm s^{-1}. At what temperature (in Kelvin) would the rms velocity of nitrous oxide be $4xcms^{-1}$?

A. 16T

B. 2T

C. 4T

D. 32T

Answer: A

39. The temperature of an ideal gas is increased from $27°C$ to $927°C$. The rms speed of its molecules becomes.

A. double the initial value

B. half of the initial value

C. four times the initial value

D. ten times the initial value

Answer: B

40. The ratio of Boyle's temperature and critical temperature for a gas is

A. $\dfrac{8}{27}$

B. $\dfrac{27}{8}$

C. $\dfrac{1}{2}$

D. $\dfrac{2}{1}$

Answer: B

41. 1 mole of sample of O_2 and 3 mole sample of H_2 are mixed isothermally in a 125.3 litre container at $125°C$ the total pressure of gaseous mixture will be

A. 2.50 bar

B. 9.8 bar

C. 1.056 bar

D. 4.038 bar

Answer: C

42. Two vessels of capacities 3 litres and 4 litres are separately filled with a gas. The pressure are respectively 202 KPa and 101 KPa. The two vessels are connected. The gas pressure now, at constant temperature, will be

A. 151.5 KPa

B. 144 KPa

C. 303 KPa

D. 175 KPa

Answer: B

> ▶ **Watch Video Solution**

43. A mixture of methane and ethane in a molar ratio of x : y has an average molecular mass of 20 u. The mean molar mass when they are mixed in the molar ratio of $y:x$ will be -

A. 22

B. 24

C. 20.8

D. 19

Answer: B

▶ **Watch Video Solution**

44. What percent of a sample of nitrogen

must be allowed to escape if its temperature ,

pressure and volume are to be chaged from

$220°C$,3 atm and 1.65 litre to $110°C$ atm and 1.00 litre respectively ?

A. 0.414

B. 0.0818

C. 0.0414

D. 0.818

Answer: D

45. Assume that for every increase in height of 1 m, pressure increases by 10 mm Hg. Initially, an experimental air balloon of maximum 200 L capacity has 150 L air at 1 atm at sea-level. At what height, the balloon is expected to burst ?

    A. 18 m above sea level

    B. 19 m above sea level

    C. 10 m above sea level

    D. 20 m above sea level

Answer: D

46. At low pressure vander Waal's equation for 3 moles of a real gas will have its simplified form

A. $\dfrac{PV}{RT - \frac{3a}{V}} = 3$

B. $\dfrac{PV}{RT + Rb} = 3$

C. $\dfrac{PV}{RT + 3Pb} = 1$

D. $\dfrac{PV}{RT - \frac{9}{V}} = 3$

Answer: A

47. 16 g of oxygen and 3g of hydrogen are mixed and kept at $760mm$ of Hg pressure and $0°C$. The total volume occupied by the mixture will be nearly _____.

A. 22.4 l

B. 33.6 l

C. 448 l

D. 44.8 l

Answer: D

48. Let the most probable velocity of hydrogen molecules at a temperature $t°C$ is V_0. Suppose all the molecules dissociates into atoms when temperature is raised to $(2t + 273).° C$ then the new rms velocity is

A. $\sqrt{2/3}V_0$

B. $\sqrt{3(2 + 273/t)V_0}$

C. $2\sqrt{3}V_0$

D. $\sqrt{6}V_0$

Answer: D

▶ **Watch Video Solution**

---

49. 0.2 g of a gas X occupies a volume of 0.44 L at some pressure and temperature. Under identical conditions of P and T, 0.1 g of CO_2 gas occupies 0.32 L. Gas X can be

A. O_2

B. SO_2

C. NO

D. C_4H_{10}

Answer: B

▶ Watch Video Solution

50. An ideal gas molecule is present at $27°C$.
By how many degree centigrade its

temperature should be raised so that its U_{rms}, U_{mp} and U_{av} all may double

A. $900° C$

B. $108° C$

C. $927° C$

D. $81° C$

Answer: A

Efficient

1. The density of a gaseous mixture of He and N_2 is found to be $\dfrac{10}{22.4}g/1$ at STP. The percentage composition of He and N_2 in this mixture respectively will be

    A. 75%, 25%

    B. 25%, 75%

    C. 30%, 70%

    D. 40%, 60%

Answer: A

2. Select the correct statement(s).

I Kinetic energy is zero at $0^{\circ}C$

II.RMS velocity of O_2 at $27^{\circ}C$ is $=$

$$\sqrt{\frac{3 \times 8.314 \times 300}{32}}\,ms^{-1}$$

III. Distribution of molecules is very small when

$u \to 0$ or $u \to \infty$

The correct choice is:

   A. I, II

   B. II, III

C. III

D. I, III

Answer: B
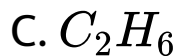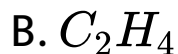
▶ **Watch Video Solution**

3. 10 " mL of " a gaseous hydrocarbon is exploded with 100 " mL of " oxygen. The residual gas on cooling is found to measure 95 mL, of which 20 mL is absorbed by caustic soda and the remaining by alkaline pyrogallol.

The formula of the hydrocarbon is

(a). CH_4.

(b). C_2H_6

(c). C_2H_4

(d). C_2H_2

A. CH_4

B. C_2H_4

C. C_2H_6

D. C_2H_2
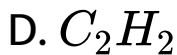
Answer: D

4. 100 ml of a mixture of methane and acetylene was exploded with excess of oxygen. After cooling to room temperature the resulting gas mixture was passed through KOH when a reduction of 135 ml in volume was noted. The composition of the hydrocarbon mixture by volume at the same temperature and pressure will be

A. 65% CH_4, 35 % C_2H_2

B. 35 % CH_4, 65 % C_2H_2

C. 25 % CH_4, 75 % C_2H_2

D. 85 % CH_4, 15 % C_2H_2

Answer: A

5. A sample of coal gas contains 50% hydrogen, 30% methane, 14% CO and 6% C_2H_4 100 ml of this coal gas is mixed with 150 ml of oxygen and the mixture is exploded.

What will be the composition of the resulting gas when it is to room temperature ?

A. $52.81\ \%\ O_2\ \&\ 47.19\ \%\ CO_2$

B. $47.33\ \%\ O_2\ \&\ 52.67\ \%\ CO_2$

C. $41.67\ \%\ O_2\ \&\ 58.33\ \%\ CO_2$

D. $33.87\ \%\ O_2\ \&\ 66.13\ \%\ CO_2$

Answer: C

▶ Watch Video Solution

6. A mixture of 15 ml of CO & CO_2 is mixed with V ml (excess) of oxygen and electrically sparked. The volume after explosion was found to be (V+12) ml. What would be the residual volume if 25 ml of the original mixture is exposed to an alkali?

A. 7ml

B. 12ml

C. 10ml

D. 9ml

Answer: C

7. 40 ml of gaseous mixture of CO and ethyne is mixed with 100 ml of O_2 and burnt. The volume of gases after combustion is 105 ml. The composition of the original mixture is

    A. 25 ml CO, 15 ml ethyne

    B. 15 ml CO, 25 ml ethyne

    C. 10 ml CO, 30 ml ethyne

D. 20 ml CO, 20 ml ethyne

Answer: A

▶ **Watch Video Solution**

8. If the pressure of N_2/H_2 mixture in a closed vessel is 100 atmospheres and 20% of the mixture reacts then the pressure at the same temperature would be .

A. Same as original

B. 110 atm

C. 90 atm

D. 80 atm

Answer: C

▶ **Watch Video Solution**

9. A vessel has N_2 gas and water vapours at a total pressure of $1atm$. The partial pressure of water vapours is $0.3atm$. The contents of this vessel are transferred to another vessel having

one-third of the capacity of original volume, completely at the same temperature the total pressure of this system in the new vessel is

A. 3 atm

B. 1 atm

C. 3.33 atm

D. 2.4 atm

Answer: D

▶ Watch Video Solution

10. At room temperature mercury has a density of 13.6 g/cc while liquid bromoform $(CHBr_3)$ has a density of 3.02 g cc. How high a column of bromoform will be supported by a pressure that supports a column of mercury 200 mm high?

   A. 98.67 cm

   B. 40.99 cm

   C. 90.07 cm

   D. 100 cm

Answer: C

11. Two flasks X and Y have capacity IL and 2L respectively and cach of them contains 1 mole of a gas. The temperatures of the flasks are so adjusted that average speed of molecules in X is A twice as those in Y. The pressure in flask X would be:

A. Same as that of Y

B. 4 times that of Y

C. Twice that of Y

D. 8 times that of Y

Answer: D

▶ **Watch Video Solution**

---

12. The root mean square velocity of one mole of a monoatomic gas having molar mass M is $V_{r.m.s}$. The relation between the average kinetic energy (E) of the gas and $V_{r.m.s}$ is :

A. $U_{rms} = \sqrt{\dfrac{3E}{2M}}$

B. $U_{rms} = \sqrt{\dfrac{2E}{3M}}$

C. $U_{rms} = \sqrt{\dfrac{2E}{M}}$

D. $U_{rms} = \left(\dfrac{E}{3M}\right)$

Answer: C

▶ **Watch Video Solution**

13. A 2.24L cylinder of oxygen at 1 atm and 273 K is found to develop a leakage. When the leakage was plugged the pressure dropped to

570 mm of Hg. The number of moles of gas that escaped will be :

A. 0.025

B. 0.05

C. 0.075

D. 0.09

Answer: A

▶ Watch Video Solution

14. 2L of SO_2 gas at 760 mm Hg are transferred to 10 L flask containing oxygen at a particular temperature, the partial pressure of SO_2 in the flask is

A. 63.33 mmHg

B. 152 mmHg

C. 760 mmHg

D. 1330 mmHg

Answer: B

Watch Video Solution

15. A football bladder contains equimolar proportions of H_2 and O_2. The composition by mass of the mixture effusing out of punctured football is in the ration $(H_2:O_2)$

A. $1:4$

B. $2\sqrt{2}:1$

C. $1:2\sqrt{2}$

D. $4:1$

Answer: A

16. In an auto engine having no pollution control device 5% of the fuel (C_8H_{18}) is left unburnt. Molar ratio under same P and T of CO and C_8H_{18} emitted in exhaust gas is .
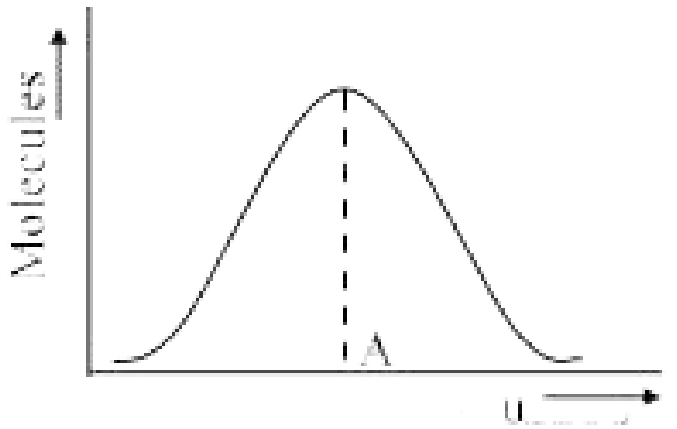
A. 100

B. 152

C. 50

D. 5

Answer: B

▶ **Watch Video Solution**

17. Distribution of molecules with velocity is represented by the curve as shown, velocity at

point A is :

A. $\sqrt{\dfrac{3RT}{M}}$

B. $\sqrt{\dfrac{2RT}{M}}$

C. $\sqrt{\dfrac{8RT}{\pi M}}$

D. $\sqrt{\dfrac{RT}{M}}$

Answer: B

18. Rate of effusion of LPG (a mixture of n-butane and propane) is 1.25 times that of SO_3. Hence, mole fraction of n-butane in LPG is

A. 0.75

B. 0.25

C. 0.5

D. 0.67

Answer: C

19. 100 mL of O_2 gas diffuse in 10 s . 100 mL of gas . X diffuses in t sec, Gas X and ktime t can be

A. H_2, $2.5\sec$

B. SO_2, $16\sec$

C. CO, $10\sec$

D. He, $4\sec$

Answer: A

20. A mixture of C_2H_2 and C_3H_8 occupied a certain volume at 80 mm Hg. The mixture was completely burnt to CO_2 and $H_2O(l)$. When the pressure of CO_2 was found to be 230 mm Hg at the same temperature and volume, the mole fraction of C_3H_8 in the mixture is :

A. 0.2

B. 0.8

C. 0.25

D. 0.75

Answer: A

21. Compressibility factor for H_2 behaving as real gas is

A. 1

B. $\left(1 - \dfrac{a}{RTV}\right)$

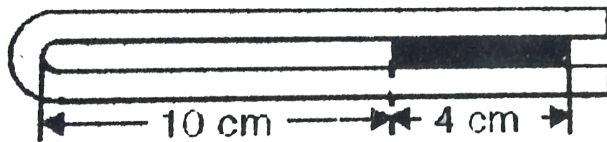C. $\left(1 + \dfrac{pb}{RT}\right)$

D. $\dfrac{RTV}{(1-a)}$

Answer: C

▶ **Watch Video Solution**

22. A 10.0 cm column of air is trapped by a column of Hg 4.00 cm long in capillary tube of uniform bore when the tube is held horizontally in a room at 1 atm. Length of the air column when the tube is held vertically

with the open end up is

A. 9.50 cm

B. 10.52 cm

C. 3.53 cm

D. 4.61 cm

Answer: A

23. At STP, a container has 1 mole of Ar, 2 moles of $CO(2)$, 3 moles of O_2 and 4 moles of N_2. Without changing the total pressure if one mole of O_2 is removed, the partial pressure of O_2 :

  A. changes by 26%

  B. is halved

  C. is unchanged

  D. changes by 33%

Answer: A

24. Two glass bulbs A and B at same temperature are connected by a very small tube having a stop-cock. Bulb A has a volume of $100 cm^3$ and contained the gas while bulb B is empty. On opening the stop-cock, the pressure fell down to 20% . The volume of the bulb B is :

A. 75cm^3`

B. $125 cm^3$

C. $66.6 cm^3$

D. $250 cm^3$

Answer: C

> ▶ **Watch Video Solution**

25. At a temperature T, K, the pressure of $4.0 gm$ argon in a bulb is P. The bulb is put in a bath having temperature higher by $50K$ than the first one 0.8 of argon gas had to be

removed to maintain original pressure. The temperature T is

A. 510K

B. 200K

C. 100K

D. 73K

Answer: B

▶ **Watch Video Solution**

26. Gaseous benzene reacts with hydrogen gas in the presence of nickel catalyst to give gaseous cyclohexane. A mixture of benzene vapour and hydrogen had a pressure of 60 mm Hg in vessel. After all benzene converted to cyclohexane, the pressure of the gas was 30 mm Hg in the same volume and at the same temperature. What fraction (by mole) of the original mixture was benzene?

A. $1/3$

B. $1/4$

C. $1/5$

D. $1/6$

Answer: D

▶ **Watch Video Solution**

27. A glass bulb is connected to an open-limb manometer. The level of mercury on both limbs was same. The bulb was heated to $57°C$. If the room temperature and atmospheric pressure are $27°C$ and 750 mmHg, the

difference of levels in the two limbs now will be

A. 2.5 cm

B. 5cm

C. 7.5 cm

D. 10 cm

Answer: C

▶ **Watch Video Solution**

28. For two gases, A and B with molecular weights M_A and M_B. It is observed that at a certain temperature. T, the mean velocity of A is equal to the root mean square velocity of B. thus the mean velocity of A can be made equal to the mean velocity of B, if:

A. A is at temperature T_1 and B at T_2 and

   $T_1 > T_2$

B. A is lowered to a temperature T_1 and

   $T_1 < T_2$

C. Both A & B are raised to a higher

temperature

D. Both A & B are placed at a lower

temperature

Answer: B

29. Certain volume of a gas exerts on its walls

some pressure at a particular temperature . It

has been found that by reducing the volume

of the gas to half of its original value the pressure become twice that of the initial value at constant temperature . this happens because

A. Mass of the gas increases with pressure

B. Speed of the gas molecules decreases

C. More number of gas molecules strike the surface per second

D. Gas molecules attract each other

Answer: C

30. If X_m, X_p and X_v represent mole fraction, pressure fraction and volume fraction respectively then:

A. $X_m = X_p = X_v$

B. $X_m = \dfrac{1}{X_p} = \dfrac{1}{X_v}$

C. $X_m = X_p = \dfrac{1}{X_v}$

D. $\dfrac{1}{X_m} = \dfrac{1}{X_p} = X_v$

Answer: A

31. The root mean square speed of the molecules of a diatomic gas is v. When the temperature is doubled, the molecules dissociate into two atoms. The new root mean square speed of the atom is

A. $\sqrt{2}v$

B. v

C. $2v$

D. $4v$

Answer: C

▶ **Watch Video Solution**

---

32. At $27°C$, hydrogen is leaked through a tiny hole into a vessel for $20\ \text{min}$. Another unknown gas at the same T and P as that of H_2, is leaked through the same hole for 20 min. After the effusion of the gases the mixture exerts a pressure of 6 atm. The

hydrogen content of the mixture is 0.7 mole. If the volume of the container is 3 litre, what is molecular weight of unknown gas ?

$$\left(\text{Use}: R = 0.821\text{L atm K}^{-1}\text{mole}^{-1}\right)$$

A. 1088

B. 10.88

C. 108.8

D. 10880

Answer: A

▶ Watch Video Solution

33. 10 " mL of " a gaseous organic compound containing C, H and O only was mixed with 100 " mL of " O_2 and exploded under condition which allowed the H_2O formed to condense. The volume of the gas after explosion was 90 mL. On treatment with KOH solution, a further contraction of 20 mL in volume was observed. The vapour density of the compound is 23. All volume measurements were made under the same condition.
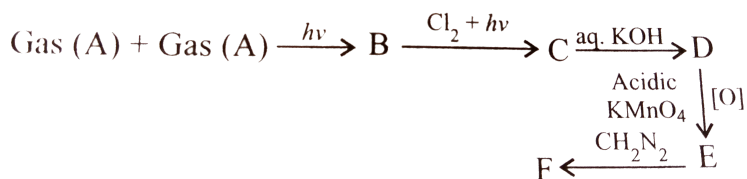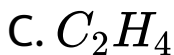
Q.The volume of CO_2 is

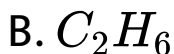A. C_2H_4O

B. C_2H_6O

C. C_3H_6O

D. C_3H_8O
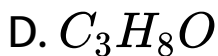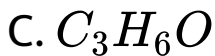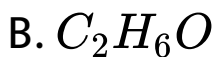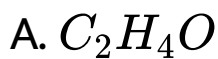
Answer: B

▶ **Watch Video Solution**

---

34. Five millilitires of a gas (A) containing only

C and H was mixed with an excess of oxygen

(30 ml) and the mixture was exploded by

means of an electric spaek. After the explosion,

the remaining volume of the mixed gasses was

25 ml. On adding a concentrated solution of

KOH, the volume further diminished to 15 ml.

The residual gas being pure oxyges.

$$\text{Gas (A)} + \text{Gas (A)} \xrightarrow{hv} B \xrightarrow{Cl_2 + hv} C \xrightarrow{aq.\ KOH} D$$

$$\text{Acidic } KMnO_4 \downarrow [O]$$

$$F \xleftarrow{CH_2N_2} E$$

Compopund (F) is:

A. C_2H_6

B. C_2H_6

C. C_2H_4

D. C_2H_2

Answer: C

35. One mole of nitrogen gas at 0.8 atm takes 38 s to diffuse through a pinhole, whereas one mole of an unknown compound of xenon with fluorine at 1.6 atm takes 57s to diffuse through the same hole. Calculate the molecular formula of the compound.

A. XeF_6

B. XeF_2

C. XeF_4

D. Any of these is possible

Answer: A

▶ **Watch Video Solution**

36. The average velocity of gas molecules is 400 m/sec calculate its rms velocity at the same temperature.

A. $434.1ms^{-1}$

B. $368.5ms^{-1}$

C. $489.9ms^{-1}$

D. $43.41ms^{-1}$

Answer: A

▶ **Watch Video Solution**

---

37. A graph is plotted between PV_m along Y-axis and P along X-axis, where V_m is the molar

volume of a real gas. Find the intercept along

Y-axis.

A. $(RT)^{-1}$

B. RT

C. $(RT)^2$

D. 1

Answer: B

38. 1.0 litre of N_2 and 7/8 litre of O_2 at the same temperature and pressure were mixed together. What is the relation between the masses of the two gases in the mixture ?

A. 1

B. 0.5

C. 2

D. 4

Answer: A

39. The volumes of two vessels at same temperature are in the ratio of $2:3$. One vessel contains H_2 and other N_2 at 600 mm and 900 mm respectively. The final pressure when they are connected together is : (Assume that N_2 and H_2 react to form NH_3)

A. 620mm

B. 760mm

C. 780 mm

D. 800mm

Answer: A

▶ **Watch Video Solution**

40. An evacuated glass vessel weighs 50 gm when empty, 148.0 gm filled with a liquid of density 0.98 gm ml^{-1} and 50.5 gm when filled with an ideal gas at 760 mm of Hg at 300 K. What is the molecular weight of the gas ?

A. 100

B. 110

C. 122

D. 90

Answer: C

▶ **Watch Video Solution**

41. A spherical ballon of 21 cm diameter is to be filled with H_2 at NTP from a cylinder containing the gas at 20 atm at $27°C$ .If the

cylinder can hold 2.80 L of water , calculate the number of ballons that can be filled up .

A. 2

B. 4

C. 8

D. 10

Answer: D

▶ **Watch Video Solution**

42. At $30°C$ and 720 mm of Hg, the density of a gas is 1.5 g/lt. Calculate molecular mass of the gas. Also find the number of molecules in 1 cc of the gas at the same temperature.

A. 2.29×10^{19}

B. 3.32×10^{18}

C. 5.66×10^{18}

D. 8.49×10^{19}

Answer: A

Watch Video Solution

43. Density of dry air containing only N_2 and O_2 is $1.15\dfrac{g}{L}$ at $740mm$ of Hg and $300K$. What is % composition of N_2 by mass in the air ?

    A. $82.5\ \%\ N_2\ \&\ 17.5\ \%\ O_2$

    B. $62.5\ \%\ N_2\ \&\ 37.5\ \%\ O_2$

    C. $42.5\ \%\ N_2\ \&\ 57.5\ \%\ O_2$

    D. $22.5\ \%\ N_2\ \&\ 77.5\ \%\ O_2$

Answer: A

44. A gas bulb of $1L$ capacity contains 2.0×10^{11} molecules of nitrogen exerting a pressure of $7.57 \times 10^3 Nm^{-2}$. Calculate the root mean square (rms) speed and the temperature of the gas molecules. If the ratio of the most probable speed to the root mean square is 0.82, calculate the most probable speed for these molecules at this temperature.

A. 232.88 m/sec

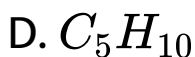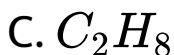B. 809.12 m/sec

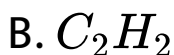C. 444.18 m/sec

D. 494.22 m/sec

Answer: D

▶ **Watch Video Solution**

45. 8.4 " mL of " gaseous hydrocarbon A was burnt with 50 " mL of " O_2 in a eudiometer tube. The volume of the products after cooling

to room temperature was 37.4 mL. When reacted with NaOH, the volume contracted to 3.8 mL. What is the molecular formula of A.

A. C_4H_6

B. C_2H_2

C. C_2H_8

D. C_5H_{10}

Answer: A

▶ Watch Video Solution

1. Pressure remaining the constant, the volume of a given mass of an ideal gas increases for every degree centigrade rise in temperature by definite fraction of its volume at:

A. $0°C$

B. its critical temperature

C. absolute zero

D. its Boyle temperature

Answer: A

2. In a closed flask of 5 L, 1.0 g of H_2 is heated from 300 to 600 K. Which statement is not correct?

    A. Pressure of the gas increases

    B. The rate of collision increases

    C. The number of moles of gas increases

D. The energy of gaseous molecules increases

Answer: C

▶ **Watch Video Solution**

3. A vessel having certain amount of oxygen at certain pressure and temperature develops a very small hole and 4 g of oxygen effuses out. How much hydrogen would have effused out

of the same vessel had it been taken at the same pressure and temperature.

A. 1g

B. 16g

C. 0.25g

D. 64g

Answer: A

▶ **Watch Video Solution**

4. In which of the following two cases more number of grams of gas molecule will hit a unit area in unit time?

(I) H_2 at 1 atm and 50K

(II) O_2 at 2atm and 200K

   A. Hydrogen

   B. Oxygen

   C. Same in both the cases

   D. Information is incomplete, hence, it can

      not be predicted.

Answer: B

5. An ideal gas cannot be liquefied because

    A. its critical temperature is always above

       $0°C$

    B. its molecules are relatively smaller in

       size

    C. it solidifies before becoming a liquid

D. forces operative between its molecules

are negligible

Answer: D

▶ **Watch Video Solution**

6. A closed flask contains water in all its three

states solid, liquid and vapour at $0°C$. In this

situation, the average kinetic energy of water

molecules will be

A. the greatest in allthe three states

B. the greatest in vapour state

C. the greatest in the liquid state

D. the greatest in the solid state

Answer: B

▶ **Watch Video Solution**

7. What is the temperature at which oxygen molecules have the same r.m.s. velocity as the hydrogen molecules at $27^\circ C$-

A. 19.3×10^4

B. 17.8×10^4

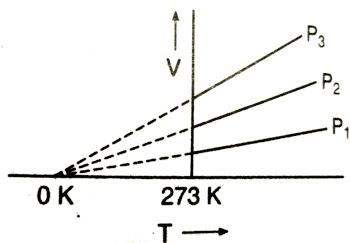C. 24.93×10^9

D. 17.8×10^8

Answer: B

▶ **Watch Video Solution**

8. The volume-temperature graphs of a given mass of an ideal gas at constant pressure are shown below. What is the correct order of

pressure ?

A. $P_3 > P_2 > P_1$

B. $P_1 > P_2 > P_3$

C. $P_2 > P_3 > P_1$

D. $P_2 > P_1 > P_3$

Answer: A

▶ Watch Video Solution

9. The most probable velocity of a gas molecule at 298 K is 300 m/s. Its rms velocity, in m/s) is

A. 420

B. 245

C. 402

D. 367

Answer: D

 Watch Video Solution

10. A cylinder of 5 L capacity, filled with air at NTP is connected with another evacuated cylinder of 30 L capacity. The resultant air pressure in both the cylinders will be

    A. 10.8 cm of Hg

    B. 14.9 cm of Hg

    C. 21.8 cm of Hg

    D. 38.8 cm of Hg

Answer: A

11. Under what conditions will a pure sample of an idela gas not only exhibit a pressure of 1 atm but also a concentration of 1 mol L^{-1}?

$(R = 0.082 \ \text{L atm mol}^{-1}\text{deg}^{-1})$

   A. At STP

   B. When V = 22.4 litres

   C. When T = 12K

   D. Impossible under any conditions

Answer: C

12. If a gas expands at contant temperature, it indicates that :

    A. kinetic energy of molecules decreases

    B. pressure of the gas increases

    C. kinetic energy of molecules remains the same

D. number of the molecules of gas

   increases

Answer: C

▶ **Watch Video Solution**

13. The temperature of a gas is raised from $27° C$ to $927° C$ The root mean square speed of the gas

   A. remains same

B. gets $\sqrt{\dfrac{927}{27}}$ times

C. gets halved

D. gets doubled

Answer: D

▶ **Watch Video Solution**

14. At what temperature, the rate of effusion of N_2 would be 1.625 times than the rate of SO_2 at $500°C$?

A. 373°

B. 620°

C. $110^\circ C$

D. 173°

Answer: B

▶ **Watch Video Solution**

15. By the ideal gas law, the pressure of 0.60 mole NH_3 gas in a 3.00 L vessel at $25^\circ C$ is

A. 48.9 atm

B. 4.89 atm

C. 0.489 atm

D. 489 atm

Answer: B

▶ Watch Video Solution

16. Average K.E. of CO_2 at $27°C$ is E. the average kinetic energy of N_2 at the same temperature will be

A. E

B. 22E

C. E/22

D. $E/\sqrt{2}$

Answer: A

▶ **Watch Video Solution**

---

17. At $25°C$ and 730 mm pressure, 380 mL of

dry oxygen was collected.If the temperature is

constant, what volume will the oxygen occupy at 760 mm pressure?

A. 569 mL

B. 365 mL

C. 265 mL

D. 621mL

Answer: B

▶ **Watch Video Solution**

18. Volume occupied by one molecule of water (density $= 1$ g cm^{-3})

    A. $3.0 \times 10^{-23} cm^3$

    B. $5.5 \times 10^{-23} cm^3$

    C. $9.0 \times 10^{-23} cm^3$

    D. $6.023 \times 10^{-23} cm^3$

Answer: D

19. At identical temperature and pressure the rate of diffusion of hydrogen gas is $3\sqrt{3}$ times that of a hydrocarbon having molecular formula C_nH_{2n-n} What is the value of n ? .

A. 1

B. 4

C. 3

D. 8

Answer: B

> ▶ Watch Video Solution

20. In the temperature changes from $27°C$ to $127°C$, the relative percentage change in RMS velocity is

   A. 1.56

   B. 2.56

   C. 15.6

   D. 82.4

Answer: C

▶ **Watch Video Solution**

21. If a gas expands at contant temperature, it indicates that :

    A. kinetic energy of molecules remains the same

    B. number of the molecules of gas increases

    C. kinetic energy of molecules decreases

    D. pressure of the gas increases

Answer: A

---

22. Given: rms velocity of hydrogen at 300K is 1.9×10^3 m/s. The rms velocity of oxygen at 1200K will be

    A. $7.6 \times 10^3 m/s$

    B. $3.8 \times 10^3 m/s$

    C. $0.95 \times 10^3 m/s$

    D. $0.475 \times 10^3 m/s$

Answer: C

---

23. At what temperature, the r.m.s. velocity of a

gas measured at $50°C$ will become double ?

A. 626K

B. 1019K

C. $200°C$

D. $1019°C$

Answer: D

---

24. The density of a gas a is twice that of gas B. Molecular mass of A is half of the molecular of B. The ratio of the partial pressures of A and B is :

A. $1/4$

B. $1/2$

C. $4/1$

D. $2/1$

Answer: C

25. The compressibility factor for an ideal gas is

A. 1

B. less than 1

C. greater than 1

D. ∞

Answer: A

 Watch Video Solution

26. In van der Waals' equation of state, the

constant 'b' is a measure of

A. intermolecular repulsions

B. intermolecular attraction

C. volume occupied by the molecules

D. intermolecular collisions per unit volume

Answer: C

▶ **Watch Video Solution**

27. Vander Waals' equation of state is obeyed by real gases. For n moles of a real gas, the expression will be

A. $\left(\dfrac{p}{n} + \dfrac{na}{V^2}\right)\left(\dfrac{V}{n-b}\right) = RT$

B. $\left(p + \dfrac{an^2}{V^2}\right)(v - nb) = nRT$

C. $\left(p + \dfrac{na}{V^2}\right)(nV - b) = nRT$

D. $\left(p + \dfrac{na}{V^2}\right)(nV + b) = nRT$

Answer: B

▶ **Watch Video Solution**

28. The energy absorbed by each molecule (A_2) of a substance is $4.4 \times 10^{-19} J$ and bond energy per molecule is $4.0 \times 10^{-19} J$. The kinetic energy of the molecule per atom will be

A. $2.2 \times 10^{-19} J$

B. $2.0 \times 10^{-19} J$

C. $4.0 \times 10^{-20} J$

D. $2.0 \times 10^{-20} J$

Answer: A

▶ **Watch Video Solution**

29. In which one of the following, does the

given amount of chlorine exert the least

pressure in a vessel of capacity 1 d m^3 at 273 K

?

A. 0.0355g

B. 0.071g

C. 6.023×10^{21} molecules

D. 0.02 mol

Answer: A

▶ **Watch Video Solution**

30. For one mole of an ideal gas, increasing the temperature from $10°C$ to $20°C$

A. increases the average kinetic energy by two times

B. increases the rms velocity of $\sqrt{2}$ times

C. increases the rms velocity by two times

D. increases both the average kinetic energy and rms velocity, but not significantly

Answer: D

31. Calculate the temperature at which 28 g of N_2 will occupy a volume of 10.0 litres at 2.46 atmospheres.

    A. 299.6K

    B. $0°C$

    C. 273K

    D. $10°C$

Answer: A

32. If p, V, M, T and R are pressure, volume, molar mass, temperature and gas constant respectively, then for and ideal gas, the density is given by

A. $\dfrac{RT}{pM}$

B. $\dfrac{p}{RT}$

C. $\dfrac{M}{V}$

D. $\dfrac{pM}{|}(RT)$

Answer: B

▶ **Watch Video Solution**

---

33. The pressure exerted by 6.0 g of methane gas in a $0.03m^3$ vessel at $129.^{\circ}C$ is

(Atomic masses : C = 12.01, H = 1.01 and $R = 8.314JK^{-1}mol^{-1}$)

A. 215216Pa

B. 13409 Pa

C. 41648 Pa

D. 31684 Pa

Answer: A

▶ **Watch Video Solution**

34. A bubble of air is underwater at temperature $15.° C$ and pressure 1.5 bar . If the bubble rises to the surface where the temperature is $25.° C$ and the pressure is 1.0

bar, what will happen to the volume of the

bubble ?

A. Volume will become greater by a factor

of 1.6

B. Volume will become greater by a factor

of 1.1

C. Volume will become smaller by a factor

of 0.70

D. Volume will become greater by a factor

of 2.5

Answer: B

---

35. Which of the following expression is true regarding gas laws? (w=weight, M=molecular mass)

A. $\dfrac{T_1}{T_2} = \dfrac{M_1 w_2}{M_2 w_1}$

B. $\dfrac{T_1}{T_2} = \dfrac{M_2 w_1}{M_1 w_2}$

C. $\dfrac{T_1}{T_2} = \dfrac{M_1 w_1}{M_2 w_2}$

D. $\dfrac{T_2}{T_1} = \dfrac{M_1 w_1}{M_2 w_2}$

Answer: A

36. Two gases A and B having the same volume diffuse through a porous partition in 20 and 10s respectively. The molecular mass of A is 49 u. Molecualr mass of B will be

    A. 50.00u

    B. 12.25 u

    C. 6.50 u

D. 25.00u

Answer: D

▶ **Watch Video Solution**

37. The mixture of three gases X, Y and Z is enclosed in a closed vessel at constant temperature. Molecular weight of X is the highest and that oly is the lcast, When equilibrium is established the

A. Gas Z will be at the top of the vessel

B. Gas Y will be at the top of the vessel

C. Gas X will be at the bottom and Z will be

at the top

D. Gases wil form homogeneous mixture

Answer: D

▶ **Watch Video Solution**

38. A bubble of gas released at the bottom of

a lake increases to four times its original

volume when it reaches the surface. Assuming

that atmospheric pressure is equivalent to the pressure exerted by a column of water 10 m high, what is the depth of the lake?

A. 80m

B. 90m

C. 40m

D. 70m

Answer: D

39. Equal weight of CH_4 and H_2 are mixed in a container at $25°C$. Fraction of total pressure exerted by methane is

A. $1/2$

B. $1/3$

C. $1/9$

D. $8/9$

Answer: C

▶ Watch Video Solution

40. A gaseous mixture was prepared by taking equal moles of CO and N_2. If the total pressure of the mixture was found 1 atmosphere, the partial pressure of the nitrogen (N_2) in the mixture is

   A. 1 atm

   B. 0.5 atm

   C. 0.8 atm

   D. 0.9 atm

Answer: B

41. By what factor does the average velocity of a gaseous molecule increase when the temperature (in Kelvin) is doubled ?

A. 1.4

B. 2

C. 2.8

D. 4

Answer: A

42. By what factor does the average velocity of a gaseous molecule increase when the temperature (in Kelvin) is doubled ?

A. 2

B. 2.8

C. 4

D. 1.4

Answer: C

43. 50 mL of each gas A and of gas B takes 150 and 200 s respectively for effusing through a pin hole under the similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be

A. 96

B. 128

C. 32

D. 64

Answer: D

 Watch Video Solution

44. 50 mL of each gas A and of gas B takes 150 and 200 s respectively for effusing through a pin hole under the similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be

A. 96

B. 128

C. 32

D. 64

Answer: B

▶ Watch Video Solution

---

45. What is the density of N_2 gas at $227°$ and 5.00 atm pressure ? (R =0.0821 atm $K^{-1}mol^{-1}$)

A. $1.40g/mL$

B. $2.81g/mL$

C. $3.41g/mL$

D. $0.29g/mL$

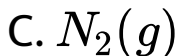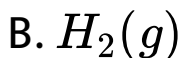**Answer: D**

▶ **Watch Video Solution**

46. Maximum deviation from ideal gas is expected from

A. $NH_3(g)$

B. $H_2(g)$

C. $N_2(g)$

D. $CH_4(g)$

Answer: A

▶ **Watch Video Solution**

47. A gas at 350 K and 15 bar has molar volume

20 percent smaller than that for an ideal gas

under the same conditions. The correct option

above the gas and its compressibility factor (Z)

is :

A. Zgt1 and attractive forces are dominant

B. Zgt1 and repulsive forces are dominant

C. Zlt1 and attractive forces are dominant

D. Zlt1 and repulsive forces are dominant

Answer: C

▶ Watch Video Solution

48. A gas such as carbon monoxide would be most likely to obey the ideal gas law at

A. high temperature and high pressures

B. low temperatures and low pressures

C. high temperatures and low pressures

D. low temperatures and high pressure

Answer: C

▶ Watch Video Solution

49. A mixture of gases contains H_2 and O_2 gases in the ratio $1:4(w/w)$. What is the molar ratio of the gases in the mixture?

    A. $4:1$

    B. $16:1$

    C. $2:1$

    D. $1:4$

Answer: A

▶ Watch Video Solution

50. Equal moles of hydrogen and oxygen gases are placed in a container with a pin-hole through which both can escape. What fraction of the oxygen escapes in the time required for one-half of the hydrogen to escape ?

A. $1/4$

B. $3/8$

C. $1/2$

D. $1/8$

Answer: D