PROBLEM SOLVING TECHNIQUES OF PHYSICAL CHEMISTRY FOR NEET

BY

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BASIC EXERCISE

1. Two flasks A and B of 500 mL each are respectively filled with O_2 and SO_2 at 300K and 1 atm pressure. The flasks contain:

(1) The same number of atoms

(2) The same number of molecules

(3) More number of moles in flask A as compared to flask B

(4) The same mass of gases

Ans. **(2)**

2. A 0.5 dm^3 flask contains gas A and 1 dm^3 flask contains gas B at the same temperature. If density of A = 3.0g dm^{-3} and that of B = 1.5g dm^{-3} and the molar mass of A = $\frac{1}{2}$ of B, then the ratio of pressure exerted by gases is –

(1) $\frac{P_A}{P_B} = 2$ (2) $\frac{P_A}{P_B} = 1$ (3) $\frac{P_A}{P_B} = 4$ (4) $\frac{P_A}{P_B} = 3$

Ans. **(3)**

3. One litre of an unknown gas weighs 1.25g at N.T.P. which of the following gas pertains to the above data

(1) CO_2 (2) NO_2 (3) N_2 (4) O_2

Ans. **(3)**

4. A gas occupies one litre under atmospheric pressure. What will be the volume of the same amount of gas under 750 mm of Hg at the same temperature.

(1) 1.0133 lit. (2) 2.0133 lit. (3) 3.0133 lit. (4) 5.0133 lit.

Ans. **(1)**

5. A flask of methane (CH_4) was weighed. Methane was then pushed out and the flask again weighed when filled with oxygen at the same temperature and pressure. The mass of oxygen would be :

(1) The same as the methane (2) Half of the methane

(3) Double of that of methane (4) Negligible in comparison to that of methane

Ans. **(3)**

6. A box of 1L capacity is divided into two equal compartments by a thin partition which are filled with 2g H_2 and 16g CH_4 respectively. The pressure in each compartment is recorded as P atm. The total pressure when partition is removed will be :

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

Ans. **(1)**

7. A 2.24L cylinder of oxygen at N.T.P. is found to develop a leakage. When the leakage was plugged the pressure dropped to 570mm of Hg. The number of moles of gas that escaped will be :

(1) 0.025 (2) 0.050 (3) 0.075 (4) 0.09

Ans. **(1)**

8. 10 g of a gas at NTP occupies 5 litres. The temp. at which the volume becomes double for the same mass of gas at the same pressure is ?

(1) 273K (2) –273^{0}C (3) 273^{0}C (4) 546^{0}C

Ans. **(3)**

9. An open vessel containing air is heated from 27^{0}C to 127^{0}C. The fraction of air originally present which goes out of it is :

(1) 3/4 (2) 1/4 (3) 2/3 (4) 1/8

Ans. **(2)**

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

(1) Pressure of the gas increases

(2) The rate of collision increases

(3) The number of moles of gas increases

(4) The energy of gaseous molecules increases

Ans. **(3)**

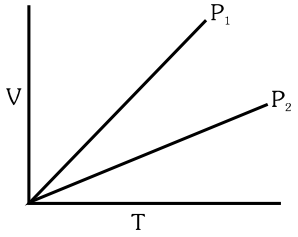
11. V versus T curves at constant pressure P_1 and P_2 for an ideal gas are shown in Fig. Which is correct

(1) $P_1 > P_2$

(2) $P_1 < P_2$

(3) $P_1 = P_2$

(4) All



Ans. **(2)**

12. The density of oxygen gas at 25^0C is 1.458 mg/litre at one atmosphere. At what pressure will oxygen have the density twice the value :

(1) 0.5 atm/25^0C (2) 2atm/25^0C (3) 4 atm/25^0C (4) None

Ans. **(2)**

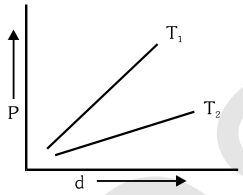
13. Figure shows graphs of pressure versus density for an ideal gas at two temperatures T_1 and T_2. Which is correct :

(1) $T_1 > T_2$

(2) $T_1 = T_2$

(3) $T_1 < T_2$

(4) None of the above



Ans. **(1)**

14. Which pair of the gaseous species diffuse through a small jet with the same rate of diffusion at same P and T :

(1) NO, CO (2) NO, CO_2 (3) NH_3,PH_3 (4) NO, C_2H_6

Ans. **(4)**

15. The rate of diffusion of methane at a given temperature is twice that of a gas X. The molecular weight of X is :

(1) 64 (2) 32 (3) 4.0 (4) 8.0

Ans. **(1)**

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

(1) H_2, CO_2, NH_3, O_2 (2) H_2, NH_3, O_2, CO_2 (3) H_2, O_2, NH_3, CO_2 (4) CO_2, O_2, NH_3, H_2

Ans. **(4)**

17. Gas A having molecular weight 4 diffuses thrice as fast as the gas B at a given T. The molecular weight of gas B is :

(1) 36 (2) 12 (3) 18 (4) 24

Ans. **(1)**

18. Four rubber tubes are respectively filled with H_2, O_2, N_2 and CO_2. The tube which will be reinflated first is :

(1) H_2 filled tube (2) O_2 filled tube (3) N_2 filled tube (4) CO_2 filled tube

Ans. **(1)**

19. A balloon filled with methane CH_4 is pricked with a sharp point and quickly plunged into a tank of hydrogen at the same pressure. After sometime the balloon will have :

(1) Enlarged (2) Collapsed

(3) Remained unchanged in size (4) Ethylene (C_2H_4) inside it

Ans. **(1)**

20. Ratio of diffusion of hydrogen is :

(1) Half of He (2) 1.4 times of He (3) Double than He (4) four times of He

Ans. **(2)**

21. 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 ratio (H_2 : O_2)

(1) 1 : 4 (2) $2\sqrt{2}$: 1 (3) 1 : $2\sqrt{2}$ (4) 4 : 1

Ans. **(1)**

22. If the vapour densities of methane & oxygen are in the ratio 1 : 2, the ratio of rate of diffusion of O_2 & CH_4 is respectively

(1) 1 : 2 (2) 1 : 1.414 (3) 2 : 1 (4) 1.414 : 1

Ans. **(2)**

23. A gas X diffuses three times faster than another gas Y the ratio of their densities i.e., D_x : D_y is

(1) 1/3 (2) 1/9 (3) 1/6 (4) 1/12

Ans. **(2)**

24. The relative rate of diffusion of a gas (Mol wt. = 98) as compared to hydrogen will be :

(1) 1/7 (2) 1/5 (3) 1/4 (4) 1

Ans. **(1)**

25. Since the atomic weights of carbon, nitrogen and oxygen are 12, 14 and 16 respectively, among the following pairs of gases, the pair that will diffuse at the same rate is :

(1) Carbon dioxide and nitrous oxide (2) Carbon dioxide and nitrogen peroxide
(3) Carbon dioxide and carbon monoxide (4) Carbon dioxide and nitric oxide

Ans. **(1)**

26. 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 :

(1) 100 (2) 250 (3) 200 (4) 80

Ans. **(1)**

27. If rate of diffusion of A is 5 times that of B, what will be the density ratio of A and B :

(1) 1/25 (2) 1/5 (3) 25 (4) 5

Ans. **(1)**

28. The rate of diffusion of a gas having molecular weight just double of nitrogen gas is 56 ml per sec the ratio of diffusion of nitrogen gas will be :

(1) 79.19 ml/sec. (2) 112 ml/sec (3) 56 ml/sec (4) 90 ml/sec

Ans. **(1)**

29. If the four tubes of a car are filled to the same pressure with N_2, O_2, H_2 and CO_2 separately then which one will be filled first :

(1) N_2 (2) O_2 (3) H_2 (4) CO_2

Ans. **(3)**

30. Under identical conditions of temperature and pressure the ratio of the rates of effission of O_2 and CO_2 gases is given by :

(1) $\frac{\text{rate of effusion of oxygen}}{\text{rate of effusion of } CO_2} = 0.87$ (2) $\frac{\text{rate of effusion of oxygen}}{\text{rate of effusion of } CO_2} = 1.17$

(3) $\frac{\text{rate of effusion of oxygen}}{\text{rate of effusion of } CO_2} = 8.7$ (4) $\frac{\text{rate of effusion of oxygen}}{\text{rate of effusion of } CO_2} = 0.117$

Ans. **(2)**

31. The correct expression for the vander waal's equation of states is :

(1) $\left(p+\frac{a}{n^2V^2}\right)(V-nb)=nRT$ (2) $\left(p+\frac{an^2}{V^2}\right)(V-nb)=\Delta nRT$

(3) $\left(p+\frac{an^2}{V^2}\right)(V-b)=nRT$ (4) $\left(p+\frac{an^2}{V^2}\right)(V-nb)=nRT$

Ans. (4)

32. Pressure of real gas is less than the pressure of ideal gas because :

(1) No. of collisions increases (2) Definite shape of molecule

(3) K.E. of molecule increases (4) Inter molecular forces

Ans. (4)

33. At relatively high pressure, van der waals' equation reduces to :

(1) $PV=RT$ (2) $PV=RT+\frac{a}{V}$ (3) $PV=RT+Pb$ (4) $PV=RT-\frac{a}{V^2}$

Ans. (3)

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

(1) 15 atm and 200 K (2) 1 atm and 273 K (3) 0.5 atm and 500 K (4) 15 atm and 500 K

Ans. (3)

35. The compressibility of a gas is less than unity at STP therefore :

(1) $V_m > 22.4$ lit (2) $V_m < 22.4$ lit (3) $V_m = 22.4$ lit (4) $V_m = 44.8$ lit

Ans. (2)

36. The values of vander 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 :

(1) O_2 (2) N_2 (3) NH_3 (4) CH_4

Ans. (3)

37. A thin balloon filled with air at 47ºC has a volume of 3 litre. If on placing it in a cooled room its volume becomes 2.7 litre, the temperature of room is :

(1) 42ºC **(2)** 100ºC **(3)** 15ºC **(4)** 200ºC

Ans. (3)

38. If a mixture containing 3 moles of hydrogen and 1 mole of nitrogen is converted completely into ammonia, the ratio of initial and final volume under the same temperature and pressure would be :

(1) 3 : 1 **(2)** 1 : 3 **(3)** 2 : 1 **(4)** 1 : 2

Ans. (3)

39. SO_2 at STP contained in a flask was replaced by O_2 under identical conditions of pressure, temperature and volume. Then the weight of O_2 will be _____ of SO_2.

(1) half **(2)** one fourth **(3)** twice **(4)** four times.

Ans. (1)

40. Assuming that O_2 molecule is spherical in shape with radius 2 Å, the percentage of the volume of O_2 molecules to the total volume of gas at S.T.P. is :

(1) 0.09 % **(2)** 0.9 % **(3)** 0.009 % **(4)** 0.045 %

Ans. **(1)**

41. An amount of 1.00 g of a gaseous compound of boron and hydrogen occupies 0.820 liter at 1.00 atm and at 3^0C. The compound is ($R = 0.0820$ liter atm $mole^{-1} K^{-1}$; at. wt: H = 1.0, B = 10.8)

(1) BH_3 **(2)** B_4H_{10} **(3)** B_2H_6 **(4)** B_3H_{12}

Ans. **(3)**

42. A and B are two identical vessels. A contains 15 g ethane at 1atm and 298 K. The vessel B contains 75 g of a gas X_2 at same temperature and pressure. The vapour density of X_2 is :

(1) 75 **(2)** 150 **(3)** 37.5 **(4)** 45

Ans. **(1)**

43. A mixture of hydrogen and oxygen at one bar pressure contains 20% by weight of hydrogen. Partial pressure of hydrogen will be

(1) 0.2 bar **(2)** 0.4 bar **(3)** 0.6 bar **(4)** 0.8 bar

Ans. **(4)**

44. X ml of H_2 gas effuses through a hole in a container in 5 sec. The time taken for the effusion of the same volume of the gas specified below under identical conditions is :

(1) 10 sec. He **(2)** 20 sec. O_2 **(3)** 25 sec. CO_2 **(4)** 55 sec. CO_2

Ans. **(2)**

45. According to kinetic theory of gases, for a diatomic molecule :

(1) The pressure exerted by the gas is proportional to the mean velocity of the molecule.
(2) The pressure exerted by the gas is proportional to the r.m.s. velocity of the molecule.
(3) The r.m.s. velocity of the molecule is inversely proportional to the temperature.
(4) The mean translational K.E. of the molecule is proportional to the absolute temperature.

Ans. **(4)**

46. The R.M.S. speed of the molecules of a gas of density 4 kg m^{-3} and pressure 1.2×10^5 N m^{-2} is :

(1) 120 $m s^{-1}$ **(2)** 300 $m s^{-1}$ **(3)** 600 $m s^{-1}$ **(4)** 900 $m s^{-1}$

Ans. **(2)**

47. The temperature of an ideal gas is increased from 120 K to 480 K. If at 120 K the root-mean-square velocity of the gas molecules is v, at 480 K it becomes :

(1) 4v **(2)** 2v **(3)** v/2 **(4)** v/4

Ans. **(2)**

48. A real gas obeying Vander Waal's equation will resemble ideal gas , if the :

(1) constants a & b are small **(2)** a is large & b is small
(3) a is small & b is large **(4)** constant a & b are large

Ans. **(1)**

49. A gaseous alkane is exploded with oxygen. The volume of O_2 for complete combustion to CO_2 formed is in the ratio 7/4. The molecular formula of alkane is :

(1) C_2H_4 **(2)** C_2H_6 **(3)** CH_4 **(4)** C_4H_{12}

Ans. **(2)**

50. The volume of CO_2 produced by the combustion of 40 ml of gaseous acetone in excess of oxygen is
(1) 40 ml **(2)** 80 ml **(3)** 60 ml **(4)** 120 ml

Ans. **(4)**

51. A vessel of volume 5 litre contains 1.4 g of nitrogen at a temperature 1800 K. The pressure of the gas if 30% of its molecules are dissociated into atoms at this temperature is :
(1) 4.05 atm **(2)** 2.025 atm **(3)** 3.84 atm **(4)** 1.92 atm

Ans. **(4)**

52. One litre of a gaseous mixture of two gases effuses in 311 seconds while 2 litres of oxygen takes 20 minutes. The vapour density of gaseous mixture containing CH_4 and H_2 is
(1) 4 **(2)** 4.3 **(3)** 3.4 **(4)** 5

Ans. **(2)**

53. Pure O_2 diffuses through an aperture in 224 second, whereas mixture of O_2 and another gas containing 80% O_2 diffuses from the same in 234 second. The molecular mass of gas will be
(1) 51.5 **(2)** 48.6 **(3)** 55 **(4)** 46.6

Ans. **(1)**

54. Calculate the compressibility factor for CO_2, if one mole of it occupies 0.4 litre at 300 K and 40 atm. Comment on the result.
(1) 0.40, CO_2 is more compressible than ideal gas **(2)** 0.65, CO_2 is more compressible than ideal gas
(3) 0.55, CO_2 is more compressible than ideal gas **(4)** 0.62, CO_2 is more compressible than ideal gas

Ans. **(2)**

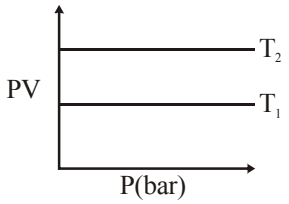
55. A sample of an ideal gas was heated from 30^0C to 60^0C at constant pressure. Which of the following statement(s) is/ are true.
(1) Kinetic energy of the gas is doubled **(2)** Boyle's law will apply
(3) Volume of the gas will be doubled **(4)** None of the above

Ans. **(4)**

56. Select correct statement(s):
(1) We can condense vapours simply by applying pressure
(2) To liquify a gas one must lower the temperature below T_C and also apply pressure
(3) At T_c, there is no distinction between liquid and vapour state, hence density of the liquid is nearly equal to density of the vapour
(4) All the statements are correct statements

Ans. **(4)**

57. The product of PV is plotted against P at two temperatures T_1 and T_2 and the 'result is shown in figure. What is correct about T_1 and T_2?



(1) $T_1 > T_2$ **(2)** $T_2 > T_1$ **(3)** $T_1 = T_2$ **(4)** $T_1 + T_2 = 1$

Ans. **(2)**

58. 2.5 L of a sample of a gas at 27°C and 1 bar pressure is compressed to a volume of 500 mL keeping the temperature constant, the percentage increase in pressure is

(1) 100 % **(2)** 400 % **(3)** 500% **(4)** 80%

Ans. **(2)**

59. At STP the order of mean square velocity of molecules of H_2, N_2, O_2 and HBr is -

(1) $H_2 > N_2 > O_2 > HBr$ **(2)** $HBr > O_2 > N_2 > H_2$

(3) $HBr > H_2 > O_2 > N_2$ **(4)** $N_2 > O_2 > H_2 > HBr$

Ans. **(1)**

ANALYTICAL EXERCISE

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

(1) 2 (2) 1/2 (3) 4 (4) 1/4

Ans. (3)

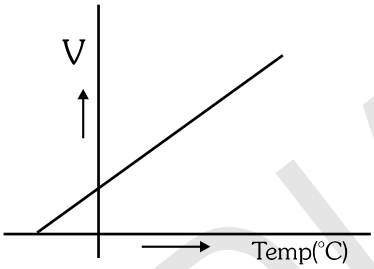
2. The following graph illustrates

(1) Dalton's Law

(2) Charles Law

(3) Boyles Law

(4) Gay Lussac Law



Ans. (2)

3. The total pressure exerted by a number non reacting gases is equal to the sum of partial pressure of the gases under the same conditions is known as :

(1) Boyle's law (2) Charle's law (3) Avogadro's law (4) Dalton's law

Ans. (4)

4. Equal masses of methane and oxygen are mixed in an empty container at 25^0C. The fraction of total pressure exerted by oxygen is :

(1) 1/3 (2) 1/2 (3) 2/3 (4) $\frac{1}{3}\times\frac{273}{298}$

Ans. (1)

5. Which out of the following statements is false ?

(1) Avogadro number = 6.02×10^{21}

(2) The relationship between average velocity $(\overline{\upsilon})$ and root mean square velocity (u) is $\overline{\upsilon}$ =0.9213 u

(3) The mean kinetic energy of an ideal gas is independant of the pressure of the gas

(4) The root mean square velocity of the gas can be calculated by the formula $\left(\frac{3RT}{M_w}\right)^{\frac{1}{2}}$

Ans. (1)

6. The molecular velocity of any gas is :-

(1) inversely proportional to the square root of temperature

(2) inversely proportional to absolute temperature

(3) directly proportional to square of temperature

(4) directly proportional to square root of temperature

Ans. (3)

7. When r, P and M represent rate of diffusion, pressure and molecular mass, respectively, then the ratio of the rates of diffusion (r_A/r_B) of two gases A and B, is given as :-

(1) $(P_A/P_B)^{1/2}\,(M_A/M_B)$ (2) $(P_A/P_B)\,(M_B/M_A)^{1/2}$

(3) $(P_A/P_B)^{1/2}\,(M_B/M_A)$ (4) $(P_A/P_B)\,(M_A/M_B)^{1/2}$

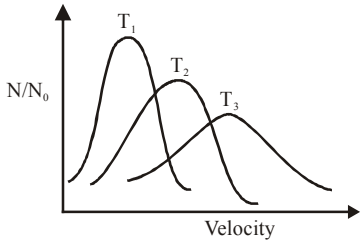
Ans. (4)

8. The compressibility factor for a real gas at high pressure is :-

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

Ans. **(4)**

9. As graph of Maxwell distribution of molecular velocities is plotted below.



Correct order to temperature

(1) $T_1 > T_2 > T_3$ (2) $T_1 < T_2 < T_3$ (3) $T_1 = T_2 > T_3$ (4) $T_1 = T_2 = T_3$

Ans. **(2)**

10. A spherical balloon of 21 cm diameter is to be filled up with H_2 at NTP from a cylinder containing the gas at 20 atm at 27°C. The cylinder can hold 2.82 litre of water. The number of balloons that can be filled up

(1) 11 (2) 10 (3) 8 (4) 1

Ans. **(2)**

11. What is the correct increasing order of liquefiability of the gas ?

(1) $H_2 < N_2 < CH_4 < CO_2$ (2) $H_2 < CO_2 < CH_4 < N_2$

(3) $CO_2 < CH_4 < N_2 < H_2$ (4) $CO_2 < CH_4 < H_2 < N_2$

Ans. **(1)**

12. 4 g argon (Atomic mass = 40) in a bulb at a temperature of T K has a pressure P atm. When the bulb was placed in hot bath at a temperature 50°C more than the first one, 0.8 g of gas had to be removed to get the original pressure. T is equal to

(1) 510 K (2) 200 K (3) 100 K (4) 73 K

Ans. **(2)**

13. A flask containing air (open to atmosphere) is heated from 300 K to 500 K. Then percentage of air escaped to the atmosphere is

(1) 20 (2) 40 (3) 60 (4) 80

Ans. **(2)**

14. Equal mass of H_2, He and CH_4 are mixed in empty container at 300 K, when total pressure is 2.6 atm. The partial pressure of H_2 in the mixture is

(1) 0.5 atm (2) 1.6 atm (3) 0.8 atm (4) 0.2 atm

Ans. **(2)**

15. At STP 16 mL of O_2 diffused through a porous partition in t seconds. What volume of CO_2 will diffuse in the same time and under the same conditions ?

(1) 13.65 mL (2) 10.5 mL (3) 20.2 mL (4) 224.8 mL

Ans. **(1)**

16. The molecular velocities of two gases at the same temperature are u_1 and u_2 and their molar masses are m_1 and m_2 respectively. Which of the following expression are correct ?

(1) $\frac{m_1}{u_1^2}=\frac{m_2}{u_2^2}$ (2) $m_1u_1 = m_2u_2$ (3) $\frac{m_1}{u_1}=\frac{m_2}{u_2}$ (4) $m_1u_1^2 = m_2u_2^2$

Ans. **(4)**

17. Correct statement

(1) At constant temperature,the KE of all the gas molecules is the same.

(2) At constant temperature, average KE of gas molecules remain constant but KE of individual molecule may differ

(3) At constant temperature, the KE is greater for heavier gas molecules

(4) At constant temperature, the KE is less for heavier gas molecules

Ans. **(2)**

18. Air constant 23% oxygen and 77% nitrogen by weight. The percentage of O_2 by volume is

(1) 28.1 (2) 20.7 (3) 21.8 (4) 23.0

Ans. **(2)**

19. When the temperature of certain sample of a gas is changed from 30°C to 606 K and its pressure is reduced to half, the volume of gas changes from V to V^2. The value of V is

(1) 2 dm^3 (2) 4 dm^3 (3) 8 dm^3 (4) Unpredictable

Ans. **(2)**

20. Molar mass of certain gas A is half that of B. If rms speed of molecules of A at certain temperature is 200 ms^{-1}. The rms speed of B at the temperature half that of A will be

(1) 200 ms^{-1} (2) 100 ms^{-1} (3) 300 ms^{-1} (4) 400 ms^{-1}

Ans. **(2)**

21. In what ratio by mass, the gases CO and 2 butene (C_4H_6) be mixed in a vessel so that they cause same partial pressures?

(1) 1 :1 (2) 2 : 1 (3) 1 : 2 (4) 1 : 3

Ans. **(3)**

22. A sample of gas contains N_1 molecules and the total kinetic energy at –123°C is E_1 ergs. Another sample of gas at 27°C has total kinetic energy as $2E_1$ ergs. Asssuming gases to be ideal, the number of gas molecules in the second sample will be

(1) N_1 (2) $N_1/2$ (3) $2N_1$ (4) $4N_1$

Ans. **(1)**

23. A gas in a vessel is heated in such a way that its pressure and volume both become two times. The temperature of the gas expressed in Kelvin scale becomes

(1) Half (2) Becomes two times

(3) Becomes 2/3rd of its original value (4) Becomes four times

Ans. **(4)**

24. At constant volume for a fixed number of a moles of a gas, the pressure of the gas increases with the rise in temperature due to

(1) Increase in average molecular speed (2) Increase in rate of collisions

(3) Increase in molecular attraction (4) Increase in mean free path

Ans. **(1)**

25 The root mean square velocity of an ideal gas at constant pressure varies with density as

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

Ans. **(4)**

26. Which of the following has maximum number of molecules ?

(1) 2.7 g of NH_3 (2) 1 L SO_2 at STP (3) 2 L of Cl_2 at STP (4) 0.1 mol of H_2S

Ans. **(1)**

27. 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 of Y is the least. When equilibrium is established the

(1) Gas X will be more at bottom (2) Gas Y will be more at top

(3) Gas X, Y, Z are homogeneously present (4) Gas Y will be more at bottom

Ans. **(1)**

28. Density of gaseous mixture A and B from percentage volume is given as

(1) $d_{mix} = \frac{d_A}{(\%A)} + \frac{d_B}{(\%B)}$ (2) $d_{mix} = d_A \times (\%A) + d_B \times (\%B)$

(3) $d_{mix} = \frac{d_A \times (\%A) + d_B \times (\%B)}{100}$ (4) $d_{mix} = \frac{d_A + d_B}{100}$

Ans. **(3)**

29. The critical temperature, Boyle's temperature and Inversion temperature respectively are given as

(1) $\frac{a}{Rb}, \frac{8a}{27Rb}, \frac{2a}{Rb}$ (2) $\frac{8a}{27Rb}, \frac{a}{Rb}, \frac{2a}{Rb}$ (3) $\frac{8a}{Rb}, \frac{a}{Rb}, \frac{2a}{Rb}$ (4) $\frac{a}{Rb}, \frac{a}{27Rb}, \frac{2a}{Rb}$

Ans. **(2)**

30. Which of the following is incorrect for pressure units ?

(1) 1 atmosphere is equal to 1.01325 bar

(2) 1.01325 bar is equal to 0.875 atmosphere

(3) 1.01325×10^5 Pa is equal to 1.01325 bar

(4) 1 atmosphere is equal to 1.01325×10^6 kg m^{-1} s^{-2}

Ans. **(2)**

31. Temperature at which gas between ideally over a wide range of pressure is called as

(1) Boyle's temperature (2) Inversion temperature

(3) Critical temperature (4) Kraft temperature

Ans. **(1)**

32. Which of the following is not correct in case of kinetic theory of gases ?

(1) Gases are made up of small particles of negligible size as compared to container size

(2) The molecules are in random motion always

(3) When molecules collide they lose energy

(4) When the gas is heated, the average kinetic energy of gas molecules increase

Ans. **(3)**

33. van der Waal's constant 'a' and 'b' are related with _____ respectively

(1) Attractive force and bond energy of molecules

(2) Attractive force and volume of molecules

(3) Volume and repulsive force of molecules

(4) Shape and repulsive force of molecules

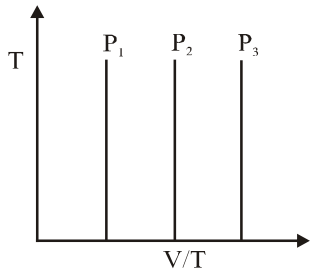
Ans. **(2)**

34. The rate of diffusion of a gas having molecular weight just double of hydrogen gas is 30 ml s^{-1}. The rate of diffusion of hydrogen gas will be

(1) 42.42 ml s^{-1} (2) 60 ml s^{-1} (3) 120 ml s^{-1} (4) 21.21 ml s^{-1}

Ans. **(1)**

35. Three lines at three different values of constant pressure are given, which of the following relation is correct ?



(1) $P_1 = P_2 = P_3$ (2) $P_1 > P_2 > P_3$ (3) $P_3 > P_2 > P_1$ (4) Can't predicted

Ans. **(2)**

36. If for the gases, the critical temperature are mentioned below i.e.,

Gas	**Critical temp.**
A	T_{C_1}
B	T_{C_2}
C	T_{C_3}
D	T_{C_4}

$T_{C_1} > T_{C_2} > T_{C_3} > T_{C_4}$

Which of the following can be predicted ?

(1) Ease of liquefaction is minimum in gas D
(2) Gas A has maximum value of van der Waal's constant 'a'
(3) Ease of liquefaction is directly proportional to van der Waal's constant 'a'
(4) All of these

Ans. **(4)**

37. At high temperature and low pressure van der Waal's equation can be expressed as

(1) $\left(P + \frac{a}{V^2}\right)(V - b) = RT$ (2) $\left(P + \frac{a}{V^2}\right)V = RT$

(3) $P(V - b) = RT$ (4) $PV = RT$

Ans. **(4)**

38. At constant volume, pressure and temperature are related as (T_0 = STP temp.)

(1) $P_t = P_0\left(1 + \frac{t}{273}\right)(t = °C)$ (2) $P_t = P_0\frac{T_0}{T}$ $(T = \text{in K})$

(3) $P_0 = P_t\left(\frac{273 + t}{273}\right)$ (4) All of these

Ans. **(1)**

39. If the ratio of C_P and C_V for a gas is 1.4. The number of atoms present in 11.2 litre of it at STP is

(1) 6.02×10^{23} (2) 1.2×10^{23} (3) 3.01×10^{23} (4) 12.04×10^{23}

Ans. **(1)**

40. The slope of the graph between log P and log V at constant temperature for a given mass of a gas is

(1) +1 (2) –1 (3) $\frac{1}{T}$ (4) $\frac{1}{n}$

Ans. **(2)**

ASSERTION & REASON EXERCISE

These questions consist of two statements each, printed as *Assertion* and *Reason.* While answering these Questions you are required to choose any one of the following four responses.

A. If both *Assertion* & *Reason* are True & the *Reason* is a correct explanation of the *Assertion*.

B. If both *Assertion* & *Reason* are True but *Reason* is not a correct explanation of the Assertion.

C. If *Assertion* is True but the *Reason* is False.

D. If both *Assertion* & *Reason* are False.

1. ***Assertion :–*** For a certain fixed amount of gas, the product PV is always constant.

Reason :– PV depends only upon the temperature.

Ans. (D)

2. ***Assertion :–*** Different gases at the same conditions of temperature & pressure have same root mean square velocity.

Reason :– Root mean square velocity is not depend on molecular weight of gas.

Ans. (D)

3. ***Assertion :–*** Average kinetic energy of a gas is directly proportional to temperature in kelvin scale.

Reason :– Average kinetic energy of a gas is inversely proportional to molecular weight of gas.

Ans. (C)

4. ***Assertion :–*** At zero degree kelvin the volume occupied by a gas is negligible.

Reason :– At constant pressure volume of a gas is directly proportional to its temperature in degree kelvin.

Ans. (A)

5. ***Assertion :–*** The pressure of real gas is less than the pressure of ideal gas.

Reason :– The intermolecular forces of attraction in real gases are greater than those of ideal gas.

Ans. (A)

6. ***Assertion :–*** Vander wall's constant 'b' is a measure of effective size of the gas molecules.

Reason :– Its value is equal to four times the actual volume of the gas molecule.

Ans. (B)

7. ***Assertion :–*** At very low pressure, the real gases behaves like ideal gases.

Reason :– At very low pressure both the correction factors can be neglected.

Ans. (D)

8. ***Assertion :–*** Observed pressure in real gases is less than the ideal gases.

Reason :– In real gases intermolecular attraction are present.

Ans. (A)

9. ***Assertion :–*** CO_2 gas will have higher rate of liquifaction then H_2 gas.

Reason :– Because CO_2 will have higher value of Z so higher inter molecular force of attraction.

Ans. (B)

10. ***Assertion :–*** In a P–V plot, below critical temperature pressure of gases is independent if compression.

Reason :– Forces of attraction and repulsion between gas molecule is equal.

Ans. (D)

11. ***Assertion :–*** Gases having higher critical temperature can be liquified easily.

Reason :– Because attractive forces are higher for gases having higher critical temperature.

Ans. (A)