CHEMISTRY

BOOKS - GRB CHEMISTRY (HINGLISH)

GASEOUS STATE

Exercise

1. If pressure of a gas contained in a closed vessel is increased by 0.4% when heated by $1^{\circ}C$, the initial temperature must be

A. 250K

B. $250^{\circ}C$

C. $25^{\circ}C$

D. 25K

Answer: a

Watch Video Solution

2. For an ideal gas number of moles per litre in terms of its pressure P gas contant R and temperature T is .

A. $\frac{PT}{R}$

B. PRT

C. $\frac{P}{RT}$

D. $\frac{RT}{P}$

Answer: c

Watch Video Solution

3. A thin balloon filled with air at $47^{\circ}C$ 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:

A. $42^{\circ} C$

B. $100^{\circ} C$

C. $15^{\circ} C$

D. $200^{\circ} C$

Answer: c

Watch Video Solution

4. If a mixture of 3 mol of H_2 and 1mole of N_2 is completely converted into NH_3, what would be the ratio of the initial and final volume at same temperature and pressure?

A. $3:1$

B. $1:3$

C. $2:1$

D. $1:2$

Answer: c

Watch Video Solution

5. 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

A. half

B. one fourth

C. twice

D. four times

Answer: a

Watch Video Solution

6. Assuming that O_2 molecule is spherical in shape with radiusw $2\overset{\circ}{A}$, the percentage of the volume of O_2 molecules to the total volume of gas at S.T.P. is :

A. 0.0009

B. 0.009

C. 9.0E-5

D. 0.00045

Answer: a

Watch Video Solution

7. Two flasks of equal volume connected by a narrow tube (of negligible volume) are at $27^\circ C$ and contain 0.70 mole of H_2 to 0.5atm One of the flask is then immersed into a bath kept at $127^\circ C$ while the other remains at $27^\circ C$ Calculate the final pressure and the number of mole of H_2 in each flask .

A. 0.5714 atm

B. 1.5714 atm

C. 0.5824atm

D. none of the above

Answer: a

Watch Video Solution

8. Two flasks of equal volume connected by a narrow tube (of negligible volume) are at $27^{\circ}C$ and contain 0.70 mole of H_2 to 0.5atm One of the flask is then immersed into a bath kept at $127^{\circ}C$ while the other remains at $27^{\circ}C$ Calculate the final pressure and the number of mole of H_2 in each flask .

A. Moles in flask 1-=0.4, Moles in flask 2=0.3

B. Moles in flask 1=0.2,Moles in flask 2=0.5

C. Moles in flask 1=0.3, Moles in flask 2=0.4

D. Moles in flask 1=0.4, Moles in flask 2=0.2

Answer: a

Watch Video Solution

9. A gas is heated from $0^\circ C$ to $100^\circ C$ at 1.0 atm pressure. If the initial volume of the gas is 10.0L, its final volume would be:

A. 7.32L

B. 10.00L

C. 13.66L

D. 20.00L

Answer: c

Watch Video Solution

10. Under what conditions will a pure sample of an ideal gas not only exhibit a pressure of $1 atm$ but also a concentration of $1 mollitre^{-1}$ $[R = 0.082$ iltre atm $mol^{-1} K^{-1}]$

A. At STP

B. When V-22.42L

C. When T=12K

D. Imposiible under any condition

Answer: c

Watch Video Solution

11. A and B are two idential vessels. A contains $15 g$ ethane at $1 atm$ 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 :

A. 75

B. 150

C. 37.5

D. 45

Answer: a

Watch Video Solution

12. The density of neon will be highest at

A. STP

B. $0^{\circ}C$,2 atm

C. $273^{\circ}C$, 1atm

D. $273^{\circ}C$, 2 atm

Answer: b

Watch Video Solution

13. A $0.5 dm^3$ flask contains gas A and $1 dm^3$ flask contains gas B at the same temperature. If density of $A = 3g/dm^3$ and that of $B = 1.5g/dm^3$ and the molar mass of $A = 1/2$ of B, the ratio of pressure excerted by gases is:

A. $\frac{P_A}{P_B} = 2$

B. $\frac{P_A}{P_B} = 1$

C. $\frac{P_A}{P_B} = 4$

D. $\frac{P_A}{P_B} = 3$

Answer: c

Watch Video Solution

14. If molecular mass of O_2 and SO_2 are 32 and 64 respectively. If one litre of O_2 at $15^\circ C$ and 759mm pressure contains N molecules, the number of molecuels in two litre of SO_2 under the same conditions of temperature and pressure will be:

A. 2N

B. N

C. N/2

D. 4N

Answer: a

Watch Video Solution

15. Lithium reacts with water to produce hydrogen gas and lithium hydroxide. What volume of hydrogen collected over water at $22^{\circ}C$ and 750mm Hg pressure is produced by the reaction of 0.208g of Li?

$[VP_{H_2O} = 19.8 mmHg][Li = 7]$

A. 367 mL

B. 378 mL

C. 735mL

D. 755mL

Answer: b

Watch Video Solution

16. Two flasks of equal volume is connected by a narrow tube (of negligible volume) contains a certain amount of N_2 gas at 2 atm and $27^\circ C$. The 1st flasks is then immersed into a bath kept at $47^\circ C$ while the 2nd flask is immeresed into a bath kept at $127^\circ C$. the ratio of the number of moles of N_2 in 1st flask to the 2nd falsk after sometime will be?

A. $5:4$

B. $2:3$

C. $3:2$

D. $4:5$

Answer: a

Watch Video Solution

17. A gas of volume 100cc is kept in a vessel at pressure 10^4 Pa maintained at temperature $24^\circ C$. If now the pressure is increased to 10^5 Pa, keeping the temperature constant, then the volume of the becomes:

A. 10cc

B. 100cc

C. 1cc

D. 1000cc

Answer: a

Watch Video Solution

18. The volume of helium is $44.8L$ at

A. $100^\circ C$ and 1 atm

B. $0^\circ C$ 1 atm

C. $0^\circ C$ and 0.5 atm

D. $100^{\circ} C$ and 0.5 atm

Answer: c

Watch Video Solution

19. 2.5L of a sample of a gas at 27° C and 1 bar pressure is compressed to a volume of 500mL keeping the temperature constnat, the percentage increase in pressure is:

A. 1

B. 4

C. 5

D. 0.8

Answer: b

View Text Solution

20. A bottle is heated with mouth open to have a final temperature as five times its original value at $25^{\circ} C$. The fraction of air originally present in the bottle that is expelled, is:

A. 0.5

B. 0.25

C. 0.33

D. 0.4

Answer: b

View Text Solution

21. The density of a gas A is twice that of a gas B at the same temperature. The molecular mass of gas B is thrice that of A. The ratio of the pressure acting on A and B will be

A. $6:1$

B. $7:6$

C. $2:5$

D. $1:4$

Answer: a

Watch Video Solution

22. The air contains 78% and 22% O_2 by volume. The volume occupied by 40g air at $20^\circ C$ and 745 mm Hg pressure approximately:

A. 34L

B. 34mL

C. 3.4kL

D. 3.4L

Answer: a

View Text Solution

23. A cylinder containing cooking gas can withstand a pressure of $15 atm$. The pressure gauge of the cylinder indicates $12 atm$ at $27^{\circ} C$. Due to a sudden fire in the building, the temperature starts rising. At what temperature will the cylinder explode?

A. 372K

B. $99.5^{\circ} C$

C. $199^{\circ} C$

D. $472.5 K$

Answer: b

Watch Video Solution

24. 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 $0.0006 gcm^{-3}$, then the volume occupied by water molecules in $1 L$ steam at this temperature is

A. $6 cm^{3}$

B. $60cm^3$

C. $0.6cm^3$

D. $0.06cm^3$

Answer: c

Watch Video Solution

25. A 2.00 litre evacuated container has a mass of 1050.0g. When the container is filled with an unknown gas at 800mm Hg pressure and $25.0^\circ C$ the mass is 1052.4g. What is the molar mass of the gas (in $g\text{mol}^{-1}$)?

A. 28

B. 31

C. 54

D. 56

Answer: a

View Text Solution

26. A sample of oxygen gas and a sample of an unknown gas are weighed separately in the same evacuated flask. Use thedata given below to find the molar mass of the unknown gas (assume experiments are carried out at the same pressure and temperature).

$| : (\text{ Mass of evacuted flask, } , 124.46 g), (\text{ Mass of flask+oxygen, } , 125.10 g),$

A. 22 g/mol

B. 38g/mol

C. 44g/mol

D. 84g/mol

Answer: c

View Text Solution

27. Value of gas constant R is .

A. 0.082 litre-atm

B. 0.987 cal $\text{mol}^{-1}K^{-1}$

C. 8.3J $\text{mol}^{-1}K^{-1}$

D. 83 erg $\text{mol}^{-1}K^{-1}$

Answer: c

Watch Video Solution

28. Which of the following parameteres would be expected to have the same values for C_2H_5OH and CH_3OCH_3?

A. Heat of vaporization

B. Vapour pressure at the same temperature

C. Boiling points

D. Gaseous denitites at the same temperature and pressure

(Assuming ideal behaviour)

Answer: d

Watch Video Solution

29. Which of the following is not the correct set of pressure and volume at constant temperature and constant moles of gas?

A. $\begin{matrix} P & V \\ 1atm & 200mL \end{matrix}$

B. $\begin{matrix} P & V \\ 760mm & 0.2L \end{matrix}$

C. $\begin{matrix} P & V \\ 0.5atm & 100L \end{matrix}$

D. $\begin{matrix} P & V \\ 2atm & 100mL \end{matrix}$

Answer: c

Watch Video Solution

30. Just below this temperature gaases would theroretically have a negative volume (which is however not possible):

A. absolute zero

B. $-100^{\circ} C$

C. $100^{\circ} C$

D. $100 K$

Answer: a

Watch Video Solution

31. The volume of a gas increases by a factor of 2 while the pressure decrease by a factor of 3 Given that the number of moles is unaffected, the factor by which the temperature changes is :

A. $\frac{3}{2}$

B. 3×2

C. $\frac{2}{3}$

D. $\frac{1}{2} \times 3$

Answer: c

Watch Video Solution

32. If V_0 is the volume of a given mass of gas at 273K at constant pressure, then accoding to Charle's law, the volume at $10^\circ C$ will be:

A. $10V_0$

B. $\frac{2}{273}(V_0 + 10)$

C. $V_0 + \frac{10}{273}$

D. $\frac{283}{273}V_0$

Answer: d

Watch Video Solution

33. On a ship sailing in pacific ocean, where temperature is $22^{\circ}C$, a balloon is filled with 2L air. What will be the voume of balloon when the ship reaches Indian ocean, where temperature is $27^{\circ}C$? The atmospheric pressure is same over pacific ocean and Indian ocean.

A. 2L

B. $\frac{600}{295}L$

C. $\frac{54}{22}L$

D. $\frac{590}{300}L$

Answer: b

Watch Video Solution

34. At constant volume, the temperature (in $.^{\circ}C$) of certain mass of a gas is increased by 20%. The pressure of gas:

A. will increase by 20%

B. will increase by $\frac{2000}{273}\%$

C. will increase by $\frac{20t}{273+t}\%$ where $t^{\circ}C$ is the initial temperature of gas

D. will increase by $\frac{20t}{273+t}\%$, where $t^{\circ}C$ is the final temperature of gas

Answer: c

Watch Video Solution

35. 0.1 mole of argon has pressure P and temperature 7K in the vessel. On keeping the vessel at $50^{\circ}C$ higher temperature, 0.8g of argon was given out to maintain same pressure. The original temperature was: [Ar=40]

A. 273K

B. 200K

C. 100K

D. 300K

Answer: b

Watch Video Solution

36. A weather balloon filled with hydrogen at 1 atm and 300 K has volume equal to 12000 liters. On ascending it reaches a place where temperature is 250 K and pressure is 0.5 atm. The volume of the balloon is :

A. 24000 liters

B. 20000 liters

C. 10000 liters

D. 12000 liters

Answer: B

Watch Video Solution

37. Four one litre flasks are separately filled with the gases, O_2, F_2, CH_4 and CO_2 under the same conditions. The ratio of number of molecules its these gases:

A. $2:2:4:3$

B. $1:1:1:1$

C. $1:2:3:4$

D. $2:3:3:4$

Answer: b

Watch Video Solution

38. At 0.821 atm and at $177^\circ C$, gas SO_3 occupies 45L Moles of neutrons present in SO_3 are: (Take $N_A = 6 \times 10^{23}$)

A. 40

B. 24×10^{24}

C. 24×10^{23}

D. 6×10^{24}

Answer: a

Watch Video Solution

39. A gas sample in a flexible container is maintained at constant pressure while its temperature is increased from $25^\circ C$ to $75^\circ C$. If the initial volume of the gas is 4.2L, what is the change in volume due to the temperature increase?

A. 0.7L

B. 4.9L

C. 8.4L

D. 12.6L

Answer: a

Watch Video Solution

Watch Video Solution

40. A sample of an ideal gas has volume of 0.500L at $25^{\circ}C$ and 1.20 atm pressure. What is its volume at $75^{\circ}C$ and 3.60 atm?

A. 0.143L

B. 0.195L

C. 0.500L

D. 1.75L

Answer: b

Watch Video Solution

41. A sample of gas occupies a volume of 9.23L at 345K and 1.40atm. What is its volume at 525K and 3.20 atm?

A. 2.65L

B. 6.14L

C. 13.9L

D. 32.1L

Answer: b

Watch Video Solution

42. When 0.25L of liquid nitrogen (d=0.807g/mL) is vaporized, what volume does the resulting gas occupy at $25^{\circ}C$ and 5.00 atm?

A. 71L

B. 54L

C. 35L

D. 32L

Answer: c

Watch Video Solution

43. A sample of He gas in a flexible container at room temperature exhibits a certain pressure. What will be the new pressure when the absolute temperature and volume of the container are both halve? The pressure of the He will be:

A. the same

B. doubled

C. halved

D. quadrupled

Answer: a

Watch Video Solution

44. A 3.0L sample of helium gas is stored in a rigid, sealed container at $25^{\circ} C$ and 1.0 atm pressure. The temperature is increased to $125 \% (\circ)C$. What is the new pressure of the gas?

A. 0.20atm

B. 0.75atm

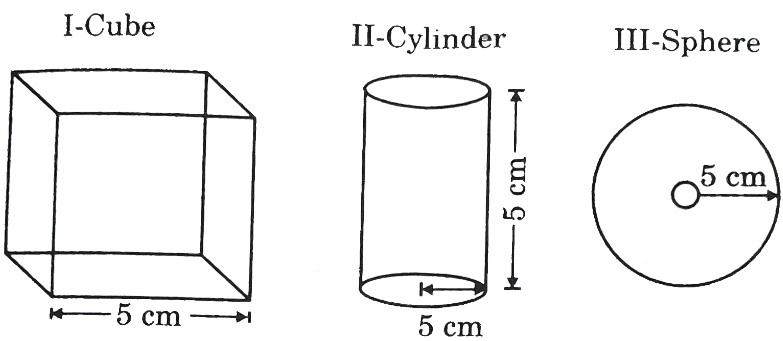
C. 1.33atm

D. 5.0atm

Answer: c

Watch Video Solution

45.



There are three closed containers in which equal moles of gas is filled if the containers are placed at the same temperature, then which of the following is correct?

A. Pressure in I is the maximum.

B. Pressure in II is the maximum.

C. Pressure in III is the maximum.

D. All in III is the maximum.

Answer: a

Watch Video Solution

46. Value of absolute zero of temperature in degree Celsius $(.^{\circ} C)$ can be determined by given data. The density of an ideal gas at $25^{\circ} C$ and $100^{\circ} C$ are 1.5 and 1.2g/L, respectively, both at the same pressure. The value of absolute zero of temperature in degree Celsius $(.^{\circ} C)$:

A. $-273^{\circ} C$

B. $-275^{\circ} C$

C. $-200^{\circ} C$

D. $-0^{\circ} C$

Answer: b

Watch Video Solution

47. Which gas has a density of 0.71 gL^{-1} at $0^{\circ}C$ and 1 atm?

A. Ar

B. Ne

C. CO

D. CH_4

Answer: d

Watch Video Solution

48. A 2.00L balloon at $20.0^{\circ}C$ and 7.45mm Hg floats an altitude where the temperature is $10.0^{\circ}C$ and the air pressure is 700mm Hg. What is the new volume of the balloon?

A. 0.94L

B. 1.06L

C. 2.06L

D. 2.20L

Answer: c

Watch Video Solution

49. A sample of gas at 273K has a pressure of P_1 and a volume of V_1. When the pressure is changed to P_2, what is the volume V_2? (Assume the temperature remains constant)

A. $\frac{P_1P_2}{V_1}$

B. $\frac{P_1V_1}{P_2}$

C. $\frac{P_2V_1}{P_1}$

D. $\frac{P_2}{P_1V_1}$

Answer: b

Watch Video Solution

50. A gas in a closed, flexible container is slowly cooled from $50^\circ C$ to $25^\circ C$. What is the ratio of the final volume of the gas to its initial volume? (Assume ideal behaviour).

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

B. $\frac{1.08}{1}$

C. $\frac{0.923}{1}$

D. $\frac{0.5}{1}$

Answer: c

Watch Video Solution

51. A sample of C_2H_6 gas initially at $50^\circ C$ and 720 mm Hg is heated to $100^\circ C$ in a container of constant volume. What is the new pressure (in mmHg)?

A. 360

B. 623

C. 831

D. 1440

Answer: c

Watch Video Solution

52. What is the molar mass of a gas if 10.0 grams of it occupy 4.48 litres at 273K and 101.3 kPa (1.00 atm)?

A. 2.00 g/mol

B. 25.0g/mol

C. 50.0g/mol

D. 100g/mol

Answer: c

Watch Video Solution

53. Which gas has the same density at $546^\circ C$ and 1.50 atm as that of O_2 gas at 1 atm and $0(\circ)C$?

A. N_2

B. NH_3

C. SO_2

D. SO_3

Answer: c

Watch Video Solution

54. A gas has a volume of 6.0L at a pressure of 0.80 atm. What is the volume if the pressure is changed to 0.20atm at constant temperature?

A. 1.5L

B. 3.0L

C. 12L

D. 24L

Answer: d

Watch Video Solution

55. What pressure (in atm) will be exerted by a 1.00g sample of methane, CH_4 in a 4.25L flask at $115^\circ C$?

A. 0.139

B. 0.33

C. 0.467

D. 7.5

Answer: c

Watch Video Solution

56. A sample of neon gas has a volume of 248 mL at $30^\circ C$ and a certain pressure. What volume would it occupy if it were heated to $60^\circ C$ at the same pressure?

A. 226mL

B. 273mL

C. 278mL

D. 496mL

Answer: b

Watch Video Solution

57. In an experiment, it was found that for a gas at constnat temperature, PV=C. The value of C depends on:

A. atmospheric pressure

B. quantity of gas

C. molecular weight of gas

D. volume of chamber

Answer: b

Watch Video Solution

58. A quantity of hydrogen gas occupies a volume of 30.0mL at a certain temperature and pressure what volume would half this mass of hydrogen occupy at triple the above temperature if the pressure were one-ninth that of the original gas?

A. 270mL

B. 90mL

C. 405mL

D. 135mL

Answer: c

Watch Video Solution

59. A spherical air bubble is rising from the depth of a lake when pressure is P atm and temperature is T K. The percentage increase in its radius when it comes to the surface of lake will be: (Assume temperature and pressure at the surface to be respectively $2TK$ and $\frac{P}{4}$)

A. 1

B. 0.5

C. 0.4

D. 2

Answer: a

Watch Video Solution

Watch Video Solution

60. For one mole of ideal gas if $P = \dfrac{P_0}{1 + \left(\frac{V}{V_0}\right)}$ where P_0 and V_0 are constant, then temperature of gas when $V = V_0$ is:

A. $\dfrac{P_0 V_0}{R}$

B. $\dfrac{P_0 V_0}{4R}$

C. $\dfrac{P_0 V_0}{2R}$

D. $\dfrac{P_0 V_0}{3R}$

Answer: c

Watch Video Solution

61. A gas at a pressure of 5.0 atm is heated from $0^\circ C$ to $546^\circ C$ and simultaneously compressed to one-third of its original volume. Hence, final pressure is:

A. 10atm

B. 30atm

C. 45atm

D. 5 atm

Answer: c

Watch Video Solution

62. A motorist inflates the tyres of her car to a pressure of 180 kPa on a day when the temperature is $-8^\circ C$. When she arrives at her destination, the tyres pressure increased to 245 kPa. What is the temperature of the tyres if we assume that the tyres expand by 7%?

A. 265K

B. 360.1K

C. 385.9K

D. 383.55K

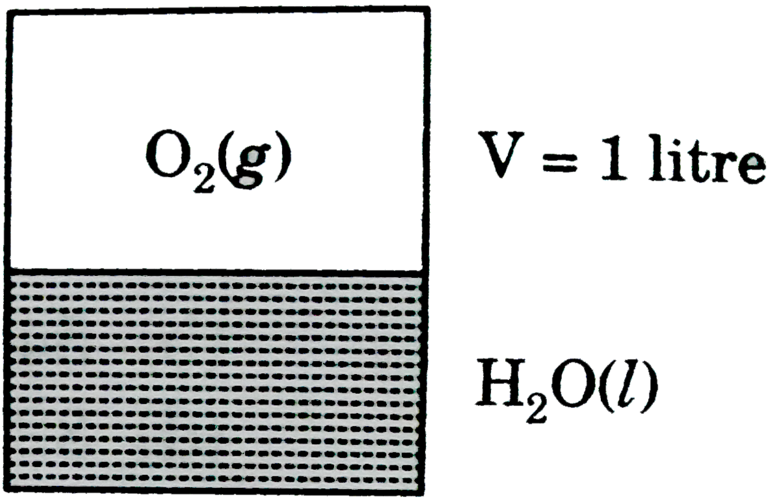
Answer: c

Watch Video Solution

63. O_2 gas is placed in a 4 litre container containing 3 L of liquid water as shown and total pressure exerted by gases is 720mm Hg.

What will be the pressure of $O_2(g)$ if given container is attached to a empty container of 3 litre at same temperature?

Given : [V.P. of H_2O at $27^\circ C = 20mm$ of Hg]



A. 175 mm of Hg

B. 350 mm of Hg

C. 200 mm of Hg

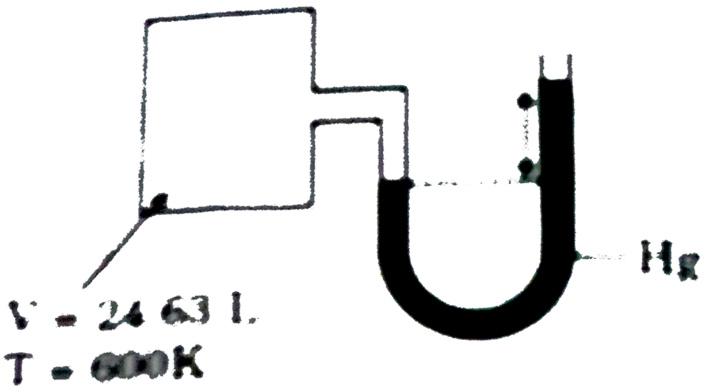
D. 800 mm of Hg

Answer: a

Watch Video Solution

64. From the following set-up, calculate moles of the gas present in the container of volume 24.63 litre at 600K if the level of mercury in the open tube of the manometer is 36cm higher.

[Given: Atmospheric pressure=78cm of mercury]



A. 1.5 moles

B. 0.73 moles

C. 3 moles

D. 1 mole

Answer: b

Watch Video Solution

65. If air is assumed to be at temperature 290K with molar mass 29 gm/mol and g=$10m/s^2$ then change in pressure at height 8.314km and ground level as a fraction of pressure at ground level is given by:

A. 1/e

B. (e-1)

C. $\frac{e-1}{e}$

D. $\frac{e}{e-1}$

Answer: c

Watch Video Solution

66. On the surface of the earth at 1 atm pressure, a balloon filled with H_2 gas occupies 500mL. This volume is $\frac{5}{6}$ of its maximum capacity. The balloon is left in air. It starts rising. The height above which the balloon will burst if temperature of the atmospere remains constant and the pressure decreases 1 mm for every 100cm rise of height is:

A. 120m

B. 136.67m

C. 126.67m

D. 100m

Answer: c

Watch Video Solution

67. A quantity of gas is collected in a graduated tube over the mercury. The volume of gas at $18^\circ C$ is 50 mL and the level of mercuty in the tube is 100mm above the outside mercuty level. The barometer reads 750 torr. Hence, volume of gas 1 atm and $0^\circ C$ is approximately:

A. 22 mL

B. 40mL

C. 20mL

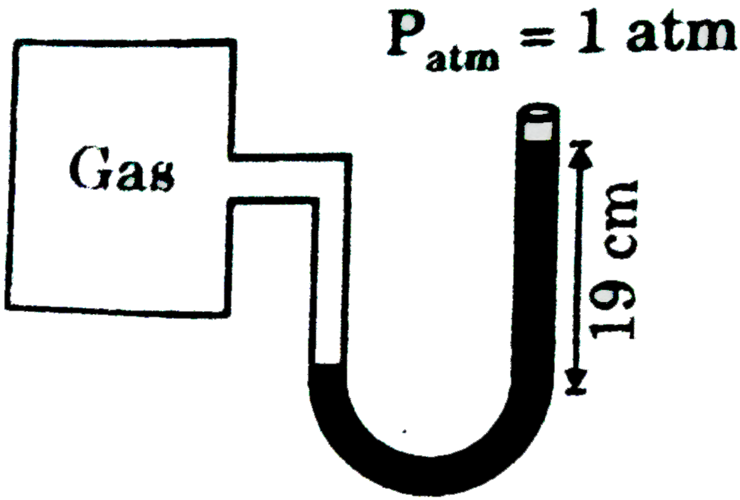
D. 44mL

Answer: b

Watch Video Solution

68. A gas A_x having mass of 100g is confined in a container of volume 16L maintained at 300K and a manometer is attached as shown, value of x is: (R=0.08 atm-L/mole-K)

(Atomic mass of A=24)



A. 2

B. 8

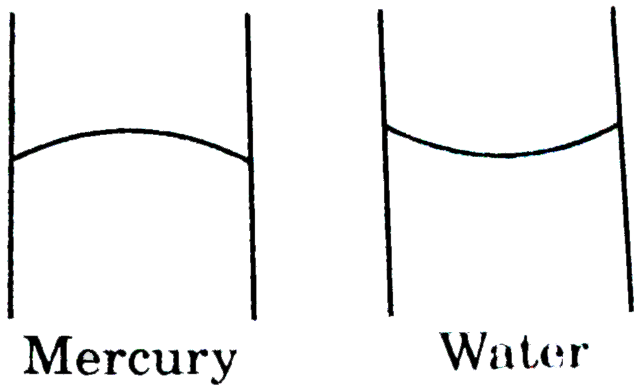
C. 4

D. 5

Answer: d

Watch Video Solution

69. In a glass tube columns of water and mercury appear as shown.



This is best attributed to the differences in their:

A. densities

B. molar masses

C. surface tensions

D. viscosities

Answer: c

View Text Solution

70. Moist air is less dense than dry air at the same temperature and barometric pressure. Which is the best explanation for this observation?

A. H_2O is a polar molecule but N_2 and O_2 are not.

B. H_2O has a higher boiling point than N_2 or O_2.

C. H_2O has a lower molar mass than N_2 or O_2.

D. H_2O has a higher heat capacity than N_2 or O_2.

Answer: c

Watch Video Solution

71. What is the major reason for using mercury (rather than water) in barometers?

A. Mercury is much denser than water.

B. Mercury has a higher boiling point than water.

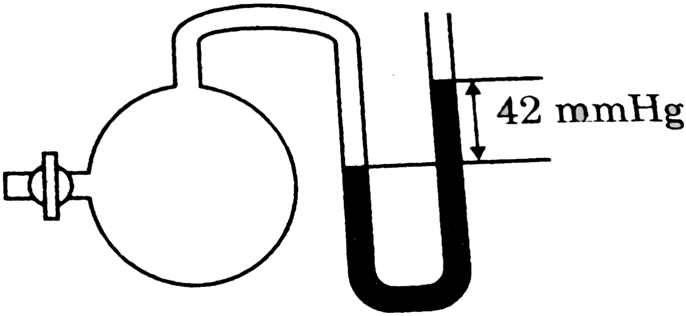
C. Mercury is chemically unreactive compared with water.

D. Mercury expands with a decrease in air pressure, water does not.

Answer: a

Watch Video Solution

72. A gas is collected in the flask shown here. What is the pressure exerted by the gas is the atmospheric pressure is 735 mmHg?



A. 42mmHg

B. 693mmHg

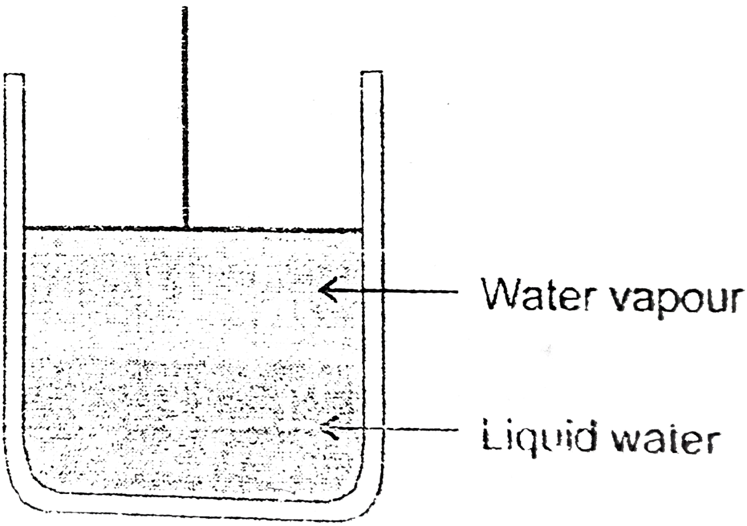
C. 735mmHg

D. 777mmHg

Answer: d

Watch Video Solution

73. The vapour pressure of water at $20^{\circ} C$ is $17.54 mmHg$. What will be the vapour pressure of the water in the apparatus shown after the piston is lowered, decreasing the volume of the gas above the liquid to one half of its initial volume (assume temperature is constant).



A. 8.77 mmHg

B. 17.54 mmHg

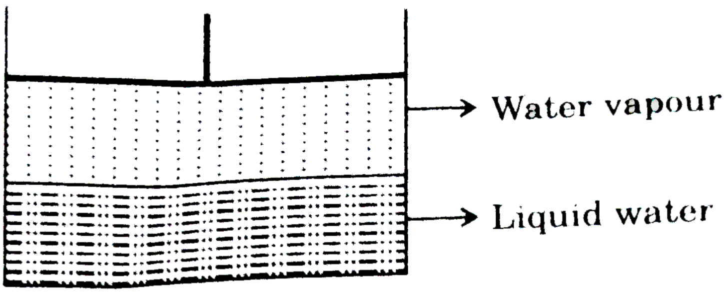
C. 35.08mmHg

D. Between 8.77 and 17.54 mmHg

Answer: b

Watch Video Solution

74. At $20^{\circ}C$ vapour pressure of $H_2O(l)$ is recorded as 28.57m bar. The initial and final vapour pressure of $H_2O(l)$, if volume of container containing $(H_2O(l)$ is increased from 5 litre to 10litre, are:



A. 57.14 m bar, 57.14 m bar

B. 14.28 m bar, 28.57 m bar

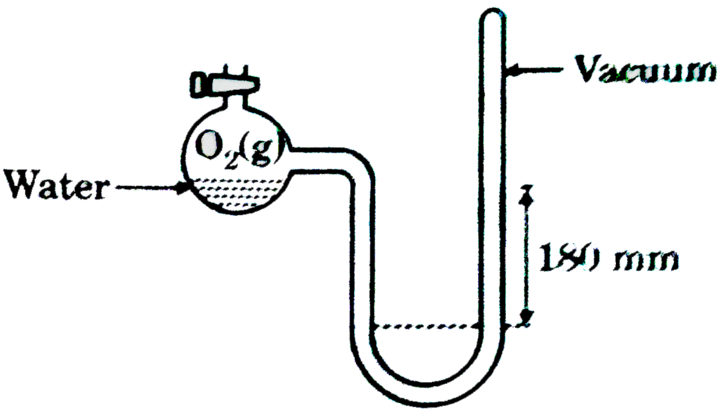
C. 28.57 m bar, 14.28 m bar

D. 28.57 m bar, 28.57 m bar

Answer: d

Watch Video Solution

75. A closed end manometer is filled with Hg as shown in the following diagram at $27^{\circ} C$ and volume of the bulb is 150mL At this temperature, the vapour pressure of water is 28mm of Hg. If the bulb contains 0.001 mol of $O_2(g)$ then find the volume of liquid water. (Given that R=0.082 L atm $\text{mol}^{-1} K^{-1}$)



A. 34 mL

B. 10 mL

C. 27 mL

D. Data insufficient

Answer: c

Watch Video Solution

76. At any top of the mountain the thermoneterreads $0^{\circ} C$ and the harometer reads 710 mm Hg. At the bottom of the mountain the temperature is $40^{\circ} C$ and pressure is 760mm Hg. Ratio of density of air at the top with that at the bottom is:

A. $1:1$

B. $1.07:1$

C. $1:1.07$

D. $1:1.5$

Answer: b

View Text Solution

77. A certain mountain is 14.100 feet above sea-level. The pressure a the top is 17.7 inches of Hg. If you blew up a balloon at sea level, where the pressure measured to be 29.7 inches and carried it to the top of the mountain, by what, factor would its volume change w.r.t. final volume?

A. 29.7-17.7

B. $\frac{29.7}{17.7}$

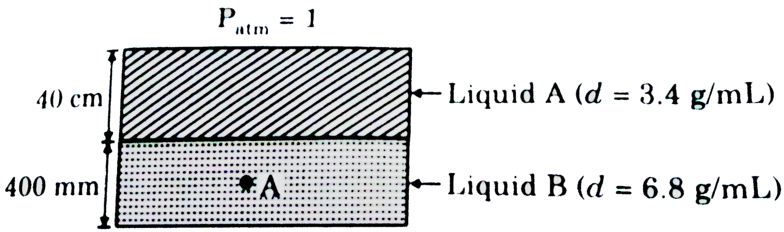
C. $\frac{17.7}{29.7}$

D. $\frac{12}{29.7}$

Answer: d

Watch Video Solution

78. Find pressure (in atm) at point A, 10 cm above the bottom of container:



A. $\frac{106}{76}$

B. $\frac{156}{76}$

C. $\frac{101}{76}$

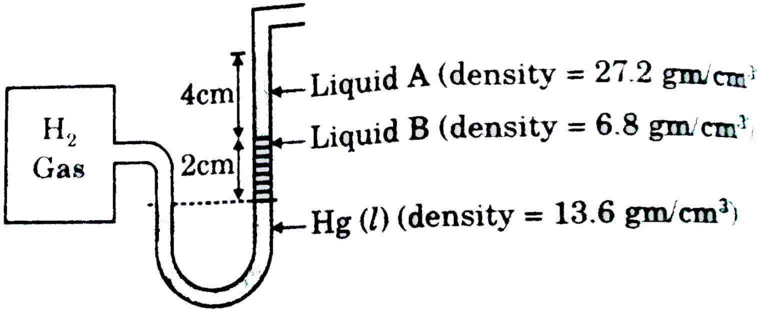
D. $\frac{91}{76}$

Answer: c

Watch Video Solution

79. A contaienr of volume 2 litre contains H_2 gas at 300 K as shown

$(P_{\text{atm}} = 76 cm of Hg)$



The pressure (in cm Hg) of H_2 in the contaienr is

A. 82cm

B. 85cm

C. 80cm

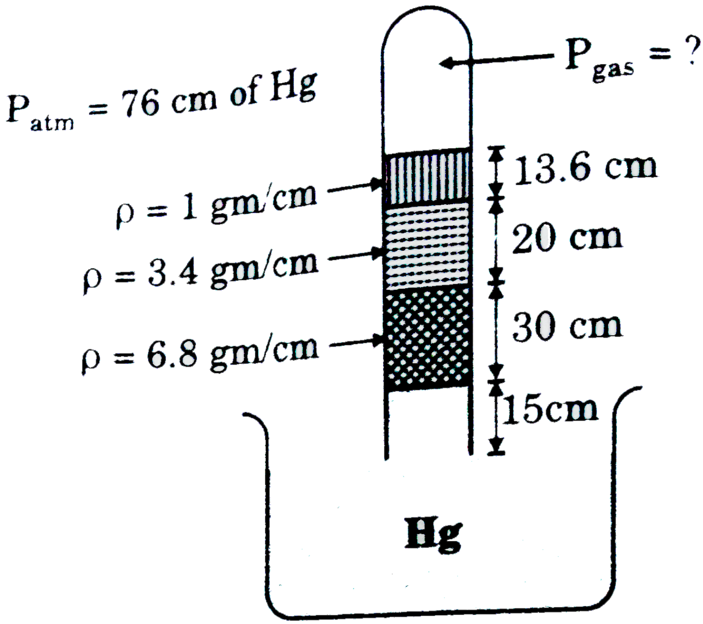
D. 81cm

Answer: b

Watch Video Solution

80. In the figure shown the pressure of the confined gas will be:

:



A. 30 cm of Hg

B. 40 cm of Hg

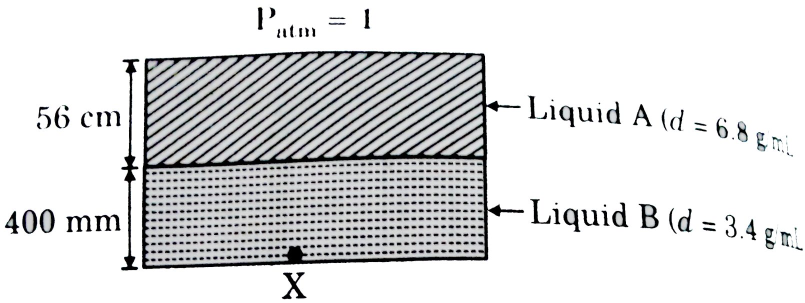
C. 36 cm of Hg

D. 46 cm of Hg

Answer: b

View Text Solution

81.



Total pressure at point (X) is:

A. 0.5 atm

B. 1 atm

C. 1.8atm

D. 1.5atm

Answer: d

Watch Video Solution

82. Equal weights of ethane and hydrogen are mixed in an empty container at $25^\circ C$. 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

83. A mixture of hydrogen and oxygen at one bar pressure contains 20% by weight of hydrogen partial pressure of hydrogen will be:

A. 0.2 bar

B. 0.4 bar

C. 0.6 bar

D. 0.8bar

Answer: d

Watch Video Solution

84. A compound exists in the gaseous phase both as monomer (A) and dimer (A_2) The mol wt of A is 48 In an experiment $96g$ of compound was confined in a container of volume 33.6 litre and heated to $273^\circ C$ Calulate the pressure developed if the compound exists as dimer to the extent of 50% by weight under same these conditions .

A. 1 atm

B. 2 atm

C. 1.5atm

D. 4 atm

Answer: b

Watch Video Solution

85. A mixture contains N_2O_4 and NO_2 in the ratio 2:1 by volume. The vapour density of the mixture is:

A. 45.4

B. 49.8

C. 32.6

D. 38.3

Answer: d

Watch Video Solution

86. Two glass bulbs A (of 100 mL capacity), and B (of 150mL capacity) containing same gas are connected by a small tube of negligible volume. At particular temperature the pressure to A was found to be 20 times more than that in bulb B. the stopcock is opened without changing the temperature. the pressure in A will:

A. drop by 75%

B. drop by 57%

C. drop by 25%

D. will remain same

Answer: b

View Text Solution

87. For 10 minutes each, at $0^{\circ} C$, from two identical holes nitrogen and an unknown gas are leaked into a common vessel of 4 litre capacity. The resulting pressure is 2.8 atm and the mixture contains 0.4 mole of nitrogen. What is the molar mass of unknown gas ? (Take $R = 0.821\text{L-atm mol}^{-1} K^{-1}$]

A. 448 g mol^{-1}

B. $224 g\text{mol}^{-1}$

C. 226 g mol^{-1}

D. None of these

Answer: a

Watch Video Solution

88. Oxygen and cyclopropane at partial pressures orf 570 torr and 170 torr respectively are mixed in a gas cylinder. What is the ratio of the number of moles of cyclopropane to the number of moles of oxygen?

A. $\frac{170}{740} = 0.23$

B. $\frac{\frac{170}{742}}{\left[\frac{170}{42} + \frac{570}{32}\right]} = 0.19$

C. $\frac{170 + 42}{570 + 32} = 0.39$

D. $\frac{170}{570} = 0.30$

Answer: d

Watch Video Solution

89. A vessel of volume 5 litre contains 1.4 g of nitrogen at a temperature 1800K. The pressure of the gas is 30% of its molecules are dissociated into atoms at this temperature is:

A. 4.05 atm

B. 2.025atm

C. 3.84atm

D. 1.92atm

Answer: d

Watch Video Solution

90. Equal masses of methane and oxygen are mixed in an empty container at $25^{\circ}C$. The fraction of the total pressure exerted by oxygen is:

A. $\frac{1}{3}$

B. $\frac{1}{2}$

C. $\frac{2}{3}$

D. $\frac{1}{3} \times \frac{273}{298}$

Answer: a

Watch Video Solution

91. $N_2 + 3H_2 \rightarrow 2NH_3$. 1 mol N_2 and 4 mol H_2 are taken in 15L flask at $27^\circ C$ After cmomplete conversion of N_2 into NH_3, $5L$ of H_2O is added pressure set up in the flask is:

A. $\frac{3 \times 0.0821 \times 300}{15}$

B. $\frac{2 \times 00821 \times 300}{10}$atm

C. $\frac{1 \times 00821 \times 300}{15}$ atm

D. $\frac{3 \times 0.0821 \times 300}{10}$ atm

Answer: d

Watch Video Solution

92. A sample of impure air contains 80% N_2. 10% 5% CO_2 and 5% Ar by volume. The average molecular weight of the sample is : [Ar=40]

A. 29.4

B. 29.8

C. 30

D. none of these

Answer: b

Watch Video Solution

93. The density of a gas A is twice that of a gas B at the same temperature. The molecular mass of gas B is thrice that of A. The ratio of the pressure acting on A and B will be

A. $1:6$

B. $7:8$

C. $6:1$

D. $1:4$

Answer: c

Watch Video Solution

94. A container consists of 1 mole of liquid water and 1 mole of $N_2(g)$, at a temperature of 300K. If aqueous tension of water at 300K is 38mm of Hg and the contaienr is fitted with a piston operating at 0.1321 atm then calculate volume occupied by N_2 gas:

(R=0.0821atm L/molk)

A. 300L

B. 600L

C. 20L

D. 80L

Answer: a

Watch Video Solution

95. The vapour density of a aseous mixture of non-reactive gases 'A' and 'B' is 40. if the molar mass of gas 'A' is 20 g/mol and the mixture contains the gases in 2:3 volume ratio, then the molar mass of gas 'B' is

A. $\frac{160}{3}$

B. 40

C. 120

D. 60

Answer: c

Watch Video Solution

96. The partial pressure of hydrogen in a flask containing two grams of hydrogen and 32 g of sulphur dioxide is:

A. $\frac{1}{16}$ th of the total pressure

B. $\frac{1}{9}$ th of the total pressure

C. $\frac{2}{3}$ rd of the total pressure

D. $\frac{1}{8}$ th of the total pressure

Answer: c

Watch Video Solution

97. Equal volume of two gases which do not react together are enclosed in separate vessels. Their pressures are 10mm and 400mm respectively. If the two vessels are joined together, then what will be the pressure of the resulting mixture (temperature remaining constant)?

A. 120mm

B. 500mm

C. 1000mm

D. 205mm

Answer: d

Watch Video Solution

98. What is the total pressure exerted by the mixture of $7.0g$ of N_2, $2g$ of hydrogen and $8.0g$ of sulphur dioxide gases in a vessel of $6L$ capacity that has been kept at $27^\circ C$.

A. 2.5bar

B. 4.5bar

C. 10 atm

D. 5.7bar

Answer: d

Watch Video Solution

99. A 40 mL of a mixture of H_2 and O_2 at $18^\circ C$ and 1 atm pressure was sparked so that the formation of water was complete. The remaining pure gas had a volume of 10mL at $18^\circ C$ and 1 atm pressure. If the remaining gas was H_2. The mole fraction of H_2 in the 40mL mixture is:

A. 0.75

B. 0.5

C. 0.65

D. 0.85

Answer: a

View Text Solution

100. A gaseous mixture contains three gaseous A, B and C with a total number of moles of 10 and total pressure of $10atm$. The partial pressure

of A and B are $3 atm$ and 1 atm respectively and if C has molecular weight of $2g/mol$. Then, the weight of C present in the mixture will be :

A. 6

B. 8

C. 12

D. 3

Answer: c

Watch Video Solution

101. For the reaction

$2NH_2(g) \rightarrow N_2(g) + 3H_2(g)$

What is the % of NH_3 converted if the mixture diffuses twice as fast as that of SO_2 under similar conditions?

A. 0.03125

B. 0.3125

C. 0.0625

D. 0.625

Answer: c

Watch Video Solution

102. 1 of NO_2 and $7/8L$ of O_2 at the same temperature and pressure were mixed together. What is the relation between the mases of the two gases in the mixture?

A. $M_{N_3} = 3M_{O_2}$

B. $M_{N_2} = 8M_{O_2}$

C. $M_{N_2} = M_{O_2}$

D. $M_{N_2} = 16M_{O_2}$

Answer: c

Watch Video Solution

103. A container contains O_2, He and SO_2 gases such that mass of SO_2 is double the mass of O_2 and mass of He is half the mass of O_2 gas. The mole fraction of SO_2 gas in the mixture is:

A. $\frac{1}{6}$

B. $\frac{2}{3}$

C. $\frac{5}{6}$

D. $\frac{3}{2}$

Answer: a

Watch Video Solution

104. 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. $P_{CO} = 0.875 P_{N_3}$

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

D. $P_{CO} = \frac{1}{2} P_{N_2}$

Answer: a

Watch Video Solution

105. Two glass bulbs A and B 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 was empty. On opening th stop cock. The pressure fell down to 40%. The volume of the bulb B must be:

A. $75 cm^3$

B. $125 cm^3$

C. $150 cm^3$

D. $250 cm^3$

Answer: c

Watch Video Solution

106. A mixture of methane and ethane in the molar ratio of x:y has a mean molar mass of 20. what would be the mean molar mass, if the gases are mixed in the molar ratio of y:x?

A. 22

B. 26

C. 20.8

D. 19

Answer: b

Watch Video Solution

107. 2 litres of moist hydrogen were collected over water at $26^{\circ} C$ at a total pressure of one atmosphere. On analysis, it was found that the quantity of H_2 collected was 0.0788 mole. What is the mole fraction of H_2 in the moist gas?

A. 0.989

B. 0.897

C. 0.953

D. 0.967

Answer: d

Watch Video Solution

108. In two different vessels X andY, $H_2O(l)$ is kept at the same temperature, the vacant space left over the surface of $H_2O(l)$ is V and 3 V respectively. What is the mass ratio of vapours in two vessels?

A. $1:3$

B. $3:1$

C. $1:4$

D. $1:1$

Answer: a

Watch Video Solution

109. A sample of H_2 is collected over H_2O at $23^\circ C$ and a pressure of 732 mm Hg has a volume of 245mL what volume would the dry H_2 occupy of $0^\circ C$ and 1 atm pressure? [VP of H_2O at $23^\circ C$=21 mm Hg]

A. 211mL

B. 218mL

C. 224mL

D. 249mL

Answer: a

Watch Video Solution

110. In a mixture of N_2 and O_2 gases, the mole fraction of N_2 is found to be 0.700. the total pressure of the mixture is 1.42atm. What is the partial pressure of O_2 in the mixture?

A. 0.211atm

B. 0.426atm

C. 0.493atm

D. 0.994atm

Answer: b

Watch Video Solution

111. A .189 g sample of liquid H_2O is injected into a 5.00L flask at $25^\circ C$. What will be present in the falsk when equilibrium is established? (Vapour pressure of H_2O at $25^\circ C$ =23.8mm Hg)

A. H_2O vapour at a presssure of 186 mm Hg

B. H_2O vapour at a pressure of 37.2 mm Hg

C. Liquid H_2O and H_2O vapour at a pressure of 37.2 mm Hg

D. Liquid H_2O and H_2O vapour at a pressure of 23.8mm Hg

Answer: d

Watch Video Solution

112. A mixture of 0.50 mol of H_2 gas and 1.3 mol of Ar gas is in a sealed container with a volume of 4.82L. If the temperature of the mixture is $50.0^\circ C$, what is the partial pressure of H_2 in the sample?

A. 1.5atm

B. 2.8atm

C. 7.2atm

D. 9.9atm

Answer: b

Watch Video Solution

113. A gaseous mixture of Ne and O_2 is taken in a copper vessel of 200mL capacity at 6 bar and $27^\circ C$. The vapur density of the gaseous mixture is 11.5. Now, the vessel is heated to $127^\circ C$, at which half of the $O_2(g)$ combined with the vessel forming a solid oxide of negligible volume. Neglecting thermal expansion in the vessel, the final partial pressure of $O_2(g)$ is : (Ne=20)

A. 1bar

B. 2 bar

C. 1.75bar

D. 7bar

Answer: a

Watch Video Solution

114. Equal masses of gaseos N_2, NH_3 and N_2O are injected into an evacuated container to produce a total pressure of 3 atm. How do the partial pressures of N_2, NH_3 and N_2O compare?

A. $P + (N_2) = P_{NH_3} = P_{N_2O}$

B. $P_{N_2} < P_{NH_3} < P_{N_2O}$

C. $P_{NH_3} < P_{N_2O}$

D. $P_{N_2O} < P_{N_2} < P_{NH_3}$

Answer: d

Watch Video Solution

115. A flask contains a mixture of Ne(g) and Ar(g). There are 0.250 mol of Ne(g) which exerts a pressure of 205 mm Hg. If the Ar(g) exerts a pressure of 492 mmHg, what mass pf Ar(g) is in the flask? (Ar=40)

A. 4.16g

B. 12.1g

C. 24.0g

D. 95.9g

Answer: c

Watch Video Solution

116. A mixture of 0.100mol of N_2 and 0.20 mol of O_2 is collected over H_2O at an atmospheric pressure of 750mm Hg and a temperature of $22^\circ C$. What is the partial pressure (in mmHg) of O_2 in this mixture?

Compound	Vapour pressure at $22^\circ C$
H_2O	$22 mmHg$

A. 478

B. 485

C. 500

D. 515

Answer: b

Watch Video Solution

117. A weighed quantity of a gas is collected over water at $25^\circ C$ and 742 mmHg. The molar mass of the gas is to be determined at standard temperature and pressure. If the vapor pressure of water is ignored during the calculation, what is the effect on the calculated pressure and calculated molar mass of the gas?

A. $\begin{array}{cc} \text{Pressur} & \text{Molar mass} \\ \text{low} & \text{low} \end{array}$

B. $\begin{array}{cc} \text{Pressur} & \text{Molar mass} \\ \text{low} & \text{high} \end{array}$

C. $\begin{array}{cc} \text{Pressur} & \text{Molar mass} \\ \text{high} & \text{low} \end{array}$

D. $\begin{array}{cc} \text{Pressur} & \text{Molar mass} \\ \text{high} & \text{high} \end{array}$

Answer: c

Watch Video Solution

118. Dalton's law cannot be applied for which gaseous mixture at normal temperatures?

A. O_2 and N_2

B. NH_3 and HCl

C. He and N_2

D. CO_2 and O_2

Answer: b

View Text Solution

119. How is the vapour pressure of a liquid in a closed container affected when the quantity of liquid is doubled at constnat temperature?

A. The vapour pressure increases

B. The vapour pressure decreases.

C. The vapour pressure stays the same.

D. The vapour presure may increase or decrease depending on the liquid.

Answer: c

Watch Video Solution

120. Hydrogen is collected over water at $22^{\circ} C$ and a barometer reading of 740 mmHg. If 300 mL of hydrogen is collected, with expression will give the volume of dry hydrogen at the same temperature and pressure?

Compound	Vapour Pressure at $22^{\circ} C$
H_2O	$20 mmHg$

A. $300 mL \times \dfrac{740 mmHg - 20 mmHg}{740 mmHg}$

B. $300 mL \times \dfrac{740 mmHg + 20 mmHg}{740 mmHg}$

C. $300 mL \times \dfrac{740 mmHg}{740 mmHg - 20 mmHg}$

D. $300mL \times \frac{740mmHg}{740mmHg + 20mmHg}$

Answer: a

Watch Video Solution

121. What is the total pressure in a 2.00 L container that holde 1.00 g He, g CO and 10.0 g of NO at $27^{\circ} C$?

A. 21.6atm

B. 13.2atm

C. 1.24atm

D. 0.310atm

Answer: b

Watch Video Solution

122. n mol of N_2 and 0.6 mol of Ar are enclosed in a vessel of capacity 2L at 1 atm and $27^\circ C$?

A. 0.3

B. 0.1

C. 0.03

D. 0.06

Answer: c

Watch Video Solution

123. Equal weight of N_2 and O_2 are put in a flask at $27^\circ C$ Calculate the partial pressure of N_2 if partial pressure $O_2 = 0.44$ atm.

A. 0.44atm

B. 0.50atm

C. 0.94atm

D. 0.38atm

Answer: b

Watch Video Solution

124. A polythene bag of 3 litre capacity is filled by helium gas (Occupying 1L at 0.3 atm and 300K) at 300K . Subsequently enough Ne gas is filled to make total pressure 0.4 atm at 300K. Calculate ratio of moles of Ne to He in container.

A. 4

B. 2

C. 1

D. 3

Answer: d

Watch Video Solution

125. A vessel contains equal masses of three gases A,B, C and recorded a pressure of 3.5 bar at $25^{\circ}C$. The molecular mass of C is twce that of B and pressure of B (in bar) in the vessel

A. 3

B. 2

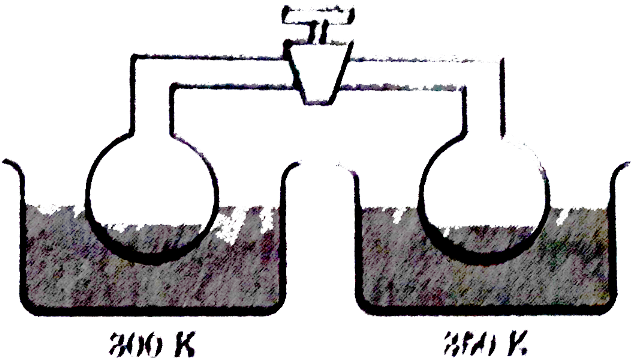
C. 4

D. 1

Answer: d

Watch Video Solution

126. Two container each containing liquid water are connected as shown in diagram.



Given that vapour pressure of $H_2O(l)$ at 300K and 350K and 22 mm of Hg and 40mm of Hg. The final pressure in each container if valve is opened while keeping the containers at the given temperatre is :

A. 22 mm of Hg

B. 40mm of Hg

C. 31mm of Hg

D. 62 mm of Hg

Answer: a

Watch Video Solution

127. A sample of air contains only N_2O_2 and H_2O. It is saturated with water vapours and total pressure is 640 torr. The vapour pressure of water is 40 torr and the molar ratio of $N_2 : O_2$ is 3:1. The partial pressure of N_2 in the sample is :

A. 540torr

B. 900torr

C. 1080torr

D. 450torr

Answer: d

Watch Video Solution

128. A vertical cylinder of height 1.52m is fitted with a movable piston of negligible mass and thickness. The lower half of the cylinder contains ideal gas and upper half is filled with Hg. The cylinder is initially at 300K.

When the temperature is raised, half of the mercury comes out of cylinder. The temperature is: (Assume no thermal expansion for Hg)

A. 337.5K

B. 364.5K

C. 546K

D. 600K

Answer: a

Watch Video Solution

129. 5 mole $H_2O_2(l)$ is placed in a container of volume 490mL at 300K, where it is completely decompositon into $H_2O(l)$ and $O_2(g)$, find exact pressure exerted by all gases.

(Given: $d_{H_2O} = 1g/mL$, Aqueous tension $H_2O(l)$ is 300K=38mm of Hg)

(Take R=0.08atm-L/mol-k)

A. 150atm

B. 150.05atm

C. 149.95atm

D. 300atm

Answer: b

Watch Video Solution

130. In a rigid contaienr NH_3 is kept at a certain temperature where its presure is found to be P_1, if dissociated into N_2 and H_2 at these conditions pressure of mixture is found to be P_s. Find ratio of P_2 of P_1.

A. 4

B. 2

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

D. $\frac{1}{4}$

Answer: a

Watch Video Solution

131. A closed vessel contains helium and ozone at a pressure of P atm. The ratio of He and oxygen atoms is 1:1. if helium is removed from the vessel the pressure of the system will reduce to:

A. 0.5P atm

B. 0.75P atm

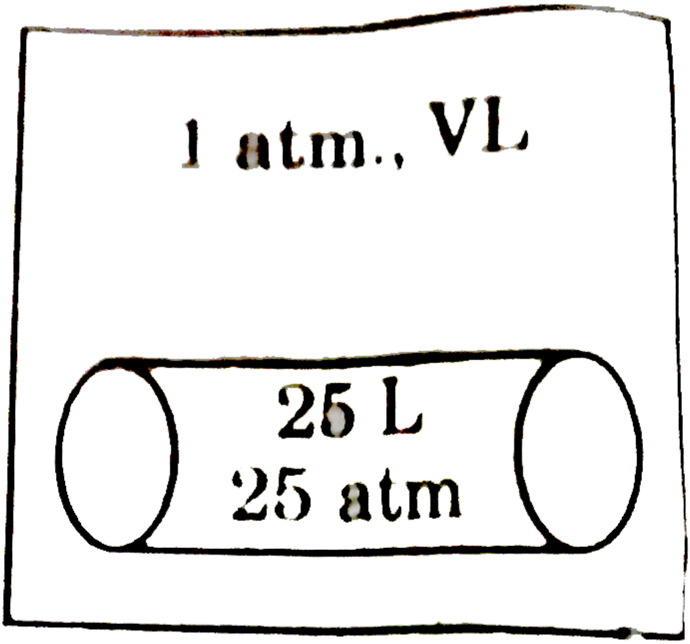
C. 0.25 P atm

D. 0.33 P atm

Answer: c

Watch Video Solution

132. Inside a drum of `V'L a sealed glass tube of volume 25L containing n inert gas at 25 atm pressure is place. The drum is now sealed. During cracket and final pressure inside drum rises to 1.5atm. Find volume of drum [Assume constnat temperature]



A. 1200L

B. 450L

C. 980L

D. 240L

Answer: a

Watch Video Solution

133. A 225 mL sample of H_2 is collected over water at $25^\circ C$ and 735mm Hg pressure. Which expression represents the set-up to find the volume of dry H_2 at $0^\circ C$ and 1 atmospehre? [VP of H_2O at $25^\circ C$=24mm of Hg)

A. $V = \dfrac{225 \times (735 - 24) \times 273}{760 \times 298}$

B. $V = \dfrac{225 \times 760 \times 298}{(735 - 24) \times 273}$

C. $V = \dfrac{225 \times 273 \times 760}{(735 + 24) \times 298}$

D. $V = \dfrac{225 \times (735 + 24) \times 298}{760 \times 273}$

Answer: a

Watch Video Solution

134. There are n connected having container having volume V, 2V,3V,...,nV separated by stopcock. All contaienr have same moles of gas at same temperature. If pressure of first contaienr is P, then final pressure when all stopcocks are opened is:

A. $\frac{np}{(n+1)}$

B. $\frac{2p}{(n+1)}$

C. $\frac{3p}{(n+1)}$

D. $\frac{p}{2(n+1)}$

Answer: b

Watch Video Solution

135. A 5.00L evacuated cylinder is charged with 25.5g of NH_3 and 36.4 g of HCl. Calculate the final pressure at $85.0^\circ C$ after the two compounds have reacted completely:

$NH_3(g) + HCl(g) \rightarrow NH_4CI(s)$

A. 2.94 atm

B. 5.88atm

C. 8.82atm

D. 14.7atm

Answer: a

Watch Video Solution

136. The rates of diffusion of SO_3, CO_2, PCl_3 and SO_2 are in the following order:

A. $PCl_3 > SO_3 > CO_2$

B. $CO_2 > SO_2 > PCl_3 > SO_3$

C. $SO_2 > SO_3 > PCl_3 > CO_2$

D. $CO_2 > SO_2 > SO_3 > PCl_3$

Answer: d

Watch Video Solution

137. 20L of SO_2 diffuse through a porous partition in 60 seconds. Volume of O_2 diffuse under similar conditions in 30 secodns will be:

A. 12,14L

B. 14.14L

C. 18.14L

D. 28.14L

Answer: b

Watch Video Solution

138. XmL of H_2 gas effuses through a hole in a container in $5s$. The time taken for the effusion of the same volume of the gas specified below, under identical conditions, is

A. 10 sec. He

B. 20 sec. O_2

C. 25sec. CO_2

D. 55sec. CO_2

Answer: b

Watch Video Solution

139. The time taken for effusion of 32 mL of oxygen will be the same as the time taken for effusion under identical condition of :

A. 64mL of H_2

B. 50mL of N_2

C. 27.3 mL of CO_2

D. 22.62mL of SO_2

Answer: c

Watch Video Solution

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

A. ahrink

B. enlarge

C. completely collapae

D. remained unchanged in size

Answer: b

Watch Video Solution

141. A bottle of dry ammonia and a bottle of dry hydrogen chloride connected through a long tube are opened simultaneously at both ends. The white ammonium chloride ring first formed will be

A. at the centre of the tube

B. near the ammonia bottle

C. near the HCl bottle

D. throughout the length of the tube.

Answer: dc

Watch Video Solution

142. The rae of effusionof heium gas at a pressure of 1000 torr is 10 torr $\min^{-1}$. What will be the rate of effusion of hydrogen gas at a pressure of 2000 torr at the same temperature?

A. 20 torr $\min^{-1}$

B. 40 torr $\min^{-1}$

C. $20\sqrt{2}$ torr $\min^{-1}$

D. 10 torr $\min^{-1}$

Answer: c

Watch Video Solution

143. One litre of a gaseous mixture of two gases mixture of two gases effuses in 311 seconds while 2 litre of oxygen takes 20 minutes. The vapour density of gaseous mixture containing CH_4 and H_2 is:

A. 4

B. 4.3

C. 3.4

D. 5

Answer: b

Watch Video Solution

144. If the number of molecules of SO_2 (atomic weight=64) effusing through an orifice of unit area of cross-section in unit time at $0^\circ C$ and 1 atm pressure in n. the number of He molecules (atomic weight=4) effusin under similar conditions at $273^\circ C$ and 0.25 atm is:

A. $\dfrac{n}{\sqrt{2}}$

B. $n\sqrt{2}$

C. 2n

D. $\frac{n}{2}$

Answer: a

Watch Video Solution

145. The ratio of rates of diffusion of SO_2, O_2 and CH_4 is

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

B. $1:2:4$

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

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

Answer: a

Watch Video Solution

146. A certain volume of H_2 effuses from an apparatus in one minute. The same volume of ozonised oxygen $(O_3 + O_2)$ mixture took 246 sec to effuse from appratus under identical conditions. Percentage of O_2 by mole in mixture is:

A. 0.8987

B. 0.1013

C. 0.7654

D. 0.7312

Answer: a

Watch Video Solution

147. Ratio of rates of diffusion of He and CH_4 (under identical conditions):

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

B. 3

C. $\frac{1}{3}$

D. 2

Answer: d

Watch Video Solution

148. A sample of ozonised oxygen diffuses $\sqrt{2}$ times faster than pure SO_3 gas under identical conditions. The mass percent of O_3 in the sample of ozonised oxygen is:

A. 60

B. 50

C. 40

D. 30

Answer: a

Watch Video Solution

149. 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:

A. 45.6

B. 48.6

C. 50

D. 46.6

Answer: d

Watch Video Solution

150. Three footballs are respectively filled with nitrogen, hydrogen and helium. If the leaking of the gas occurs with time from the filling hole,

then the ratio of the rate of leaking of gases $(r_{N_2} : r_{H_2} : r_{He})$ from three footballs (in equal time interval) is :

A. $(1 : \sqrt{14} : \sqrt{7})$

B. $(\sqrt{14} : \sqrt{7} : 1)$

C. $(\sqrt{14} : 1 : \sqrt{7})$

D. $(1 : \sqrt{7} : \sqrt{14})$

Answer: a

Watch Video Solution

151. A straight glass tube as shown, has 2 inleta X and Y at the two ends of 200 cm long tube. HCl gas through inlet X and NH_3 gas through inlet Y are allowed to enter in the tube at the same time and pressure at a point P inside the tube. The distance of point P from X is:

A. 118.9cm

B. 81.1cm

C. 91.1 cm

D. 108.9cm

Answer: b

Watch Video Solution

152. A teacher enters a classroom from front door while a student from back door. There are 13 equidistant rows of benches in the classroom. The teacher releases N_2O, the laughing gas, from the first bench while the student releases the weeping gas $(C_6H_{11}OBr)$ from the last bench. At which row will the students starts laughing and weeping simultaneously?

A. 7

B. 10

C. 9

D. 8

Answer: c

Watch Video Solution

153. Which of the following statements are correct?

A. Helium diffuses at a rate 8.65 times as much as CO does

B. Helium escapes at a rate 2.65 times as fast as CO does

C. Helium escapes at a rate 4 times as fast as CO_2 does

D. Heium escapes at a rate 4 times as fast as SO_2 does

Answer: d

Watch Video Solution

154. Calculate composition of the effusing gas (by mass) if the inside gas consist of mixture of H_2 and O_2 in a molar ratio of 2:1 respectively.

A. $\frac{100}{8}\% H_2$

B. $\frac{800}{9}\% H_2$

C. $\frac{100}{3}\% \ H_2$

D. $\frac{200}{3}\% \ H_2$

Answer: c

Watch Video Solution

155. A bottle of dry NH_3 and another bottle of dry HCl connected through a long tube are opened simultaneously at both ends of the tube. The white ring (NH_4Cl) first formed will be

A. A

B. B

C. C

D. A,B and C simultaneously

Answer: c

Watch Video Solution

156. Compounds of uranium-235 and uranium -238can be separated from one another by:

A. distillation

B. effusion

C. fractional crystallization

D. paper chromatography

Answer: b

Watch Video Solution

157. A certain volume of argon gas (Mol. Wt.=40) requires 45s to effuse through a hole at a certain pressure and temperature. The same volume of another gas of unknown molecular weight requires 60s to pass through the same hole under the same conditions of temperature and pressure. The molecular weight of the gas is:

A. 53

B. 35

C. 71

D. 120

Answer: c

Watch Video Solution

158. A gas diffuses one-thrid as fast as O_2 at $100^\circ C$. This gas could be:

A. He(M=4)

B. $C_2H_5(M = 48)$

C. $C_7H_{12}(M = 96)$

D. $C_5F_{12}(M = 288)$

Answer: d

View Text Solution

159. A x:1 molar mixture of He and CH_4 is contained in a vessel as 20 bar pressure. Due to a hole in the vessel, the gas mixture leaks out.if the composition of the mixture effusing out initially is 8:1, then calculate the value of of x?

A. 1

B. 4

C. 8

D. 9

Answer: b

View Text Solution

160. Which noble gas effuses approximately twice are fast as Kr?

Molar Mass (g/mol)	
Ne	20.18
Ar	39.95
Kr	83.80
Xe	13.13
Rn	222

A. Ne

B. Ar

C. Xe

D. Rn

Answer: a

View Text Solution

161. An unknown gas effuses through a pin-hole in a container at a rate of 7.2 mmol/s/ Under the same condition gaseous oxygen effuses at a rate of 5.1 mmol/s. what is the molar mass (in g/mol) of the unknown gas?

A. 16

B. 23

C. 45

D. 64

Answer: a

View Text Solution

162. Which pair of gases has the same average rate of diffusion at $25^{\circ} C$?

A. He and Ne

B. N_2 and O_2

C. N_2O and CO_2

D. NH_3 and HCl

Answer: c

View Text Solution

163. Helium is often found with methance, CH_4. How do the diffusion rates of helium and methane compare at the same temperature? Helium diffuses:

A. sixteen times as fast as methane.

B. four times as fast as methane.

C. twice as fast as methane.

D. at the same rate as methane.

Answer: c

View Text Solution

164. An unknown gas effuses through a small hole one half as fast as methane, CH_4, under the same conditions. What is the molar mass of the unknown gas?

A. $4 g \mathrm{mol}^{-1}$

B. $8 g \mathrm{mol}^{-1}$

C. $32 g \mathrm{mol}^{-1}$

D. $64 g . \mathrm{mol}^{-1}$

Answer: d

View Text Solution

165. Oxygen, which is 16 times as dense as hydrogen, diffuses:

A. $\frac{1}{16}$ times as fast

B. $\frac{1}{4}$ times as fast

C. 4 times as fast

D. 16 times as fast

Answer: b

View Text Solution

166. The rate of effusion of two gases $'a'$ and $'b'$ under identical conditions of temperature and pressure are in the ratio of $2:1$ What is the ratio of rms velocity of their molecules if T_a and T_b are in the ratio of $2:1$?

A. $\sqrt{2}:1$

B. $2:1$

C. $1:\sqrt{2}$

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

Answer: d

Watch Video Solution

167. Which gas effuses fastest under identical conditions?

A. N_2

B. O_2

C. Cl_2

D. CH_4

Answer: d

View Text Solution

168. The rate of diffusion of two gases A and B are in the ratio 16:3. if the ratio of their masses present in the mixture is 2:3 then:

A. The ratio of their molar masses is 16:1

B. The ratio of their molar masses is 4:1

C. The ratio of their moles present inside the container is 1:24

D. The ratio of their moles inside the container is 8:3

Answer: d

View Text Solution

169. The rate of diffusion of a gas is

A. directly proportional to its density

B. directly proportional to its molecular weight

C. directly proportional to the square of its molecular weight

D. Inversely proportional to the square root of its molecular weight

Answer: d

Watch Video Solution

170. Certain amount of oxygen gas was passed over heated carbon, where 80% of oxygen added was converted into CO gas, as per reaction

$2C(s) + O_2(g) \rightarrow 2CO(g)$

If gaseous mixture left is allowed to effuse, then, ratio of rate of effusionof CO to O_2 will be:

View Text Solution

171. Hydrogen gas diffuses four times as rapidly as a mixture of C_2H_4 and CO_2. The molar ratio of C_2H_4 to CO_2 in the mixture is

A. $1:1$

B. $2:1$

C. $3:1$

D. $3:2$

Answer: c

Watch Video Solution

172. Cl_2O^7 gas decomposes as:

$Cl_2O^7 \rightarrow Cl_2 + O_2$

$Cl_2O^7 \rightarrow Cl_2 + O_2$

A partially decomposed gaseous mixture is allowed to effuse through a pin-hole and the gas coming out initially was analysed . The mole fraction of the O_2 was found to be 0.60. the degree of dissociation of Cl_2O^7 will be:

A. 0.1

B. 0.2

C. 0.4

D. 0.6

Answer: b

Watch Video Solution

173. One litre of gaseous mixture of CH_4 and H_2 effuses in 200 seconds while one litre of gas 'X' takes 10 minutes to effuse in identical condition s. If molar ratio of $CH_4 : H_2$ in mixture is 1:2. find molar

A. 20

B. 30

C. 40

D. 60

Answer: d

View Text Solution

174. A gas cylinder contains 320 gm of O_2 at 30 atm and $27^\circ C$ what mass (in gram) of O_2 would escape if first the cylinder is heated to $127^\circ C$ and then valve is held open until the pressure the cylinder become 1 atm (the temperature being maintained at $127^\circ C$).

A. 312

B. 315

C. 340

D. 320

Answer: a

Watch Video Solution

175. Sulphur and fluorine form SF_6 and S_2F_{10}, both of which are gases at $30^\circ C$. When an equimolar mixture of them is allowed to effuse through a pinhole, what is the ratio SF_6 / S_2F_{10} in the first sample that escapes?

Molar mass	$g\text{mol}^{-1}$
SF_6	146
S_2F_{10}	254

A. $\dfrac{1.32}{1}$

B. $\dfrac{1.74}{1}$

C. $\dfrac{3.03}{1}$

D. $\frac{3.48}{1}$

Answer: a

View Text Solution

176. Temperature at which $r.m.s$ speed of O_2 is equal to that of neon at $300K$ is:

A. 280K

B. 480K

C. 680K

D. 180K

Answer: b

Watch Video Solution

177. The rms speed of the molecules of a gas of density 4 kg m^{-3} and pressure $1.2 \times 10^5 Nm^{-2}$ is:

A. $120ms^{-1}$

B. $300ms^{-1}$

C. $600ms^{-1}$

D. $900ms^{-1}$

Answer: b

View Text Solution

178. The mass of molecule A is twice that of molecule B. The root mean square velocity of molecule A is twice that of molecule B. If two containers of equal volume have same number of molecules the ratio of pressure $\frac{P_A}{P(B)}$ will be:

A. $8:1$

B. $1:8$

C. $4:1$

D. $1:4$

Answer: a

View Text Solution

179. The kinetic energy of N molecules of O_2 is x joule at $-123^\circ C$. Another sample of O_2 at 27°C has a kinetic energy of 2x. The latter sample contains molecules of O_2.

A. N

B. $\frac{N}{2}$

C. 2N

D. 3N

Answer: a

Watch Video Solution

180. Calculate the average kinetic energy (in joule) per molecule in $8.0g$ of methane at $27^{\circ}C$.

A. 6.21×10^{-20} J/molecule

B. 6.21×10^{-21} J/molecule

C. 6.21×10^{-22} J/molecule

D. 3.1×10^{-22} J/molecule

Answer: b

Watch Video Solution

181. According to kinetic theory of gases, for a datomic molecule.

A. The pressure exerted by gas is proportional to the mean velocity of the molecule.

B. The pressure exerted by the gas is proportional to the rms velocity of the molecule.

C. The rms velocity of the molecule is inverasely proportional to the temperature.

D. The mean tranalational K.E. of the molecule is proportional to the absolute temperature.

Answer: d

Watch Video Solution

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

A. 4v

B. 2v

C. $\frac{v}{2}$

D. $\frac{v}{4}$

Answer: b

View Text Solution

183. The ratio between the rms velocity of H_2 at 50K and that of O_2 at 800K is:

A. 4

B. 2

C. 1

D. $\frac{1}{4}$

Answer: c

View Text Solution

184. If two gases A and B and temperatures T_A and T_B respectively have identical Maxwellian plots, then which of the following statements is true?

A. $T_B = T_A$

B. $M_B = M_A$

C. $\frac{T_A}{M_B} = \frac{T_B}{M_A}$

D. Gases A and B may be O_2 and SO_2 at $27^\circ C$ and $327^\circ C$ respectively.

Answer: d

View Text Solution

185. If a gas is allowed to expand at constant temperature then:

A. the kinetic energy of the gas molecules decreases

B. the kinetic energy of the gas molecules increases

C. the kinetic energy of the gas molecules increases

D. none of the above

Answer: c

View Text Solution

186. A helium atom is two times heavier than a hydrogen molecule. At $298K$, the average kinetic energy of a helium atom is

A. two times that of hydrogen molecules

B. same as that jof hydrogen molecules

C. four times that of hydrogen molecules

D. half that of hydrogen molecules

Answer: b

Watch Video Solution

187. The ratio of the average molecular kinetic energy of UF_6 to that of H_2. Both at 300K is:

A. $1:1$

B. $7:2$

C. $176:1$

D. $2:7$

Answer: a

View Text Solution

188. At what temperature will hydrogen molecules have the same kinetic energy an nitrogen molecules have at $35^\circ C$?

A. $\left(\frac{28 \times 35}{2}\right).^\circ C$

B. $\left(\frac{2 \times 35}{28}\right).^\circ C$

C. $\left(\frac{2 \times 28}{35}\right).^\circ C$

D. $35^{\circ} C$

Answer: d

View Text Solution

189. The translational kinetic energy of 10^{20} molecules of nitrogen at a certain temperature is 0.629J. What is the temperature in $.^{\circ} C$?

A. $43.3^{\circ} C$

B. $23^{\circ} C$

C. $30.^{\circ} C$

D. $15.8^{\circ} C$

Answer: c

View Text Solution

190. K.E. of one mole of helium at 273 K is:

A. 819 cal

B. 81.9cal

C. 8.19cal

D. none of these

Answer: a

View Text Solution

191. The kinetic energy for 14 grams of nitrogen gas at $127^{\circ} C$ is nearly (mol. Mass of nitrogen=28 and gas constant=8.31J/mol/K.)

A. 1.0J

B. 4.15J

C. 2492.2J

D. 3.3J

Answer: c

View Text Solution

192. At the same T and P, which of the following gases will have the highest average kinetic energy per mole? (at. Wt. H=12,O=16,8=32,F=19)

A. H_2

B. O_2

C. CH_4

D. SF_6

Answer: e

View Text Solution

193. Calculate the temperature at which the rms velocity of sulphur dioxide molecules is the same as that of oxygen at 300K.

A. $600^{\circ} C$

B. 600K

C. 300K

D. $300^{\circ} C$

Answer: NA

View Text Solution

194. Which of the following statements is not true?

A. The ratio of the mean speed to the rms speed is independent of the temperature.

B. The square of the mean speed of the molecuels is equal to the mean square speed at a certain temperature

C. Mean kinetic energy of the gas molecuels at any given temperature is independent of the mean sped.

D. The difference between rms speed and mean speed at any temperature for different gases diminishes as larger and yet larger molar masses are considered.

Answer: b

Watch Video Solution

195. Which of the following statements is incorrect according to kinetic theory of gases?

A. At constant temperature, velocity of an individual gas molecule changes many times in one second.

B. All gas molecules are assumed to the spherical in shape.

C. Between two collisions a gas molecule may travel in curved paths.

D. There is no attraction or repulsion force between gas molecuels.

Answer: c

Watch Video Solution

196. Which is not one of the postulates of the kinetic molecular theory?

A. At a constant temp. all the particle have the same speed.

B. There are no force of attraction between molecules.

C. Gas particles move in a straight line between collisions.

D. The molecules are in a state of constant random motion.

Answer: a

Watch Video Solution

197. The root mean square velocity of a gas molecule at 100K and 0.5 atm pressure is $106.4 ms^{-1}$. If the temperature is raised to 400K and the pressure is raised to 2 atm, the root mean square velocity becomes:

A. $106.4 ms^{-1}$

B. $425.6ms^{-1}$

C. $212.8ms^{-1}$

D. $851.2ms^{-1}$

Answer: c

View Text Solution

198. Which relationship holds true for Boltzmann constnat 'K' and gas constant 'R' (N_A is Avogadro number)?

A. $R = k \times N_A$

B. $k = R \times N_A$

C. $R \times k = N_A$

D. $R = K^2 \times N_A$

Answer: a

View Text Solution

199. The kinetic energy of two moles of CO_3 at a certain temperature is 1800cal. The temperature of the gas is :

A. 300K

B. 150K

C. 200K

D. 400K

Answer: a

View Text Solution

200. In a certain sample of gas at $25^{\circ}C$ the number of molecules having speeds between 4 km $\sec^{-1}$ and 4.1 km $\sec^{-1}$ is N. if the total number of gas molecules at the same temperature are doubled what will happen?

A. Value of most probable velocity will change

B. Area under the Maxwell's curve for distribution of speeds will increases by four times.

C. No of molecules between 4 km $\sec^{-1}$ and 4.1 km $\sec^{-1}$ will become 2N.

D. No of molecules between 4km $\sec^{-1}$ amd 4.1 km $\sec^{-1}$ will remain same.

Answer: c

View Text Solution

201. A 10 g sample of oxygen gas is taken in a container of volume 1 litre and is found to exert a pressure of 3 bar. Which of the following options is correct regarding speed of the molecuels?

A. All the molecules are moving at a same speed which is equal to 310 m/sec.

B. $U_{\text{avg}} = 300m/\sec$

C. $U_{\mathrm{mps}} = 300 \times \sqrt{\frac{2}{5}}$ m/sec.

D. $U_{\mathrm{mps}} = 310$ m/sec.

Answer: c

View Text Solution

202. The slope of the curves near origin corresponding to energy distribution and speed distribution for an ideal gas is given by:

A. Both V

B. Both $'\infty'$

C. 0',$'\infty'$ respectively

D. $'\infty'$,'0' respectively

Answer: d

Watch Video Solution

203. Which of the following samples of ideal gas will have maximum translation kinetic energy??

A. $\frac{1}{2}$ mole of $CO(g)$ at 400K

B. 16g of oxygen gas at 200K

C. 28g of nitrogen gas at 300K

D. 1g of ozone at 600K

Answer: c

View Text Solution

204. Which of the following statements is not true about the effect of a n increase in temperature on the distribution of molecular speeds of an ideal gas?

A. The area under the curve remains same even at the higher temperature.

B. The distribution pattern becomes more uniform.

C. Fraction of molecules with speed greater than a particular high speed will increases.

D. The fraction of molecules having most probable

Answer: d

View Text Solution

205. If for two gases of molecular weights M_A and M_B at temperature T_A and $T_B : T_A M_B = T_B M_A$, then which property has the same magnitude for both the gases?

A. Density

B. Pressure

C. KE per mol

D. rms speed

Answer: d

View Text Solution

206. Kinetic theory of gases proves:

A. only Boyle's law

B. only Charle's law

C. only Avogardo's law

D. all of these

Answer: d

View Text Solution

207. According to kinetic theory of gases in an ideal gas between two successive collisions a gas molecule travels:

A. in a straight line path

B. with an accelerated velocity

C. in a circular path

D. in a way path

Answer: a

View Text Solution

208. As the temperature is raised from $20^\circ C$ to $40^\circ C$ the average kinetic energy of neon atoms changes by a factor

A. 2

B. $\sqrt{\frac{313}{293}}$

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

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

Answer: c

View Text Solution

209. Three closed vessels A,B and C are at the same temperature T and contains gases which obey the Mawellian distribution of velocities. Vessel A containe only O_2. B only N_2 and C a mixture of equal quantities of O_2 and N_2. If the average speed of the O_2 molecules in vessel A is V_1, that of the N_2 molecule in vessel C is:

A. $\frac{(V_1 + V_2)}{2}$

B. V_1

C. $(V_1 + V_2)^{1/2}$

D. $\sqrt{3kT/M}$

Answer: b

View Text Solution

210. At STP, the order of mean square velocity of molecuels of H_2, N_2, O_2 and HBr is:

A. $H_2 > N_2 > O_2 > HBr$

B. $HBr > O_2 > N_2 > H_2$

C. $HBr > H_2 > O_2 > N_2$

D. $N_2 > O_2 > H_2 > HBr$

Answer: a

View Text Solution

211. AT what temperature root mean square speed of N_2 gas is equal to that of propane gas at STP condition?

A. $173.7^\circ C$

B. 173.7K

C. STP

D. $-40^{\circ} C$

Answer: b

View Text Solution

212. Helium atom is two times heavier than a hydrogen molecule at 298 K, the average kinetic energy of helium is

A. two times that of hydrogen molecules

B. same as that jof hydrogen molecules

C. four times that of hydrogen molecules

D. half that of hydrogen molecules

Answer: b

View Text Solution

213. If most probable velocity is represented by 'a' and fraction possessing it by 'f' , then with increase in temperature which one of the following is correct?

A. a increases/decreases

B. a decreases,fincreases

C. both a and f decrease

D. boht a and f increase

Answer: a

View Text Solution

214. When CO_2 under high pressure is released from a fire extinguisher. Particles of soloid CO_2 are formed, despite the low sublimation temperature $(-77^\circ C)$ of CO_2 at 1.0atm it is:

A. the gas does work pushingback the atmosphere using KE of molecuels and thus lowering the temperature

B. volume of the gas is decreased rapidly hence, temperature is lowered

C. both a and b

D. none of the above

Answer: a

View Text Solution

215. At what temperature will the total KE of 0.3 mo of He be the same as the total KE of 0.40 mol of Ar at 400K?

A. 533K

B. 400K

C. 346K

D. 300K

Answer: a

View Text Solution

216. 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 and $T_2 T_1 > T_2$

B. A is lowered to a temperature $T_2 < T$ while B is at T

C. Both A and B are raised to a higher temperature

D. Both A and B are lowered in temperature.

Answer: b

Watch Video Solution

217. At what temperature, the average speed of gas molecules be double of that at temperature, $27^{\circ} C$?

A. $120^{\circ} C$

B. $108^{\circ} C$

C. $927^{\circ} C$

D. $300^{\circ} C$

Answer: c

Watch Video Solution

218. A sample of a gas was heated from $30^{\circ} C$ to $60^{\circ} C$ at constant pressure. Which of the following statement(s) is true?

A. Kinetic energy of the gas is doubled

B. Boyle's law will appply

C. Volume of the ga will be doubled

D. None of the above

Answer: d

View Text Solution

219. Which of the following expression correctly represents the relationship between the average kinetic energy of CO and N_2 molecules at the same temperature?

A. $\overrightarrow{E}(CO) > \overrightarrow{E}(N_3)$

B. $\overrightarrow{E}(CO) < \overrightarrow{E}(N_2)$

C. $\overrightarrow{E}(CO) = \overrightarrow{E}N_2$

D. Cannot be predicted unless volumes of the gases are given

Answer: c

View Text Solution

220. If equal weights of oxygen and nitrogen are placed in separate containers of equal volume as the same temperature, which one of the following statements is true? (mol wt. $N_2 = 28, O_2 = 32$)

A. Both flasks contains the same number of molecules.

B. The pressure in the nitrogen flask is greater than the one in the oxygen flask.

C. More molecules are present in the oxygen flask.

D. The nitrogen has a greater average kinetic energy per mole.

Answer: b

View Text Solution

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

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

B. $\sqrt{3\left(2+\frac{273}{t}\right)V_0}$

C. $2\sqrt{3}V_0$

D. $\sqrt{6}V_0$

Answer: d

Watch Video Solution

222. The rms velocity of hydrogen is $\sqrt{7}$ times the rms velocity of nitrogen. If T is the temperature of the gas, then:

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

View Text Solution

223. The root mean square velocity of an ideal gas at constant pressure varies with density (d) as:

A. d^2

B. d

C. $\sqrt{d}$

D. $\frac{1}{\sqrt{d}}$

Answer: d

View Text Solution

224. For one mole of gas the average kinetic energy is given as E. the U_{rms} of gas is:

A. $\sqrt{\frac{2E}{M}}$

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

C. $\sqrt{\dfrac{2E}{3M}}$

D. $\sqrt{\dfrac{3E}{2M}}$

Answer: a

View Text Solution

225. Express the average kinetic energy per mole of monostomic gas of molar mass M. at temperature T K in terms of the average speed of the molecules U_{avg}.

A. $\dfrac{8M}{2\pi}U_{\text{avg}}^2$

B. $\dfrac{3M}{16}U_{\text{avg}}^2$

C. $\left(\dfrac{2M}{\pi}\right)U_{\text{avg}}^2$

D. $\left(\dfrac{2\pi M}{16}\right)U_{\text{avg}}^2$

Answer: d

View Text Solution

226. Four particles have speed 2,3,4 and 5 cm/s respectively. Their rms speed is:

A. 3.5 cm/s

B. $\left(\frac{27}{2}\right)cm/s$

C. $\sqrt{54}cm/s$

D. $\left(\frac{\sqrt{54}}{2}\right)cm/s$

Answer: d

View Text Solution

227. A gas mixture at $27^{\circ}C$ and 1 atm contains equal masses of He, H_2, CO_2 and CH_4. How do their molecular velocities compare?

A. $He = H_2 = CO_2 = CH^4$

B. $He < H_2 < CO_2 < CH_4$

C. $H_2He < CH_4 < CO_2$

D. $CO_2 < CH_4 < He < H_2$

Answer: d

View Text Solution

228. The average molecular velocity in a gas sample at 300K is 500m/s. The temperature of this gas is increased until the average velocity of its molecules is 1000m/s. what is the new temperature?

A. 420K

B. 573k

C. 600k

D. 1200k

Answer: d

View Text Solution

229. Two samples of gas, one of argon and one of helium, have the same pressure, temperature and volume. Which statement is true assuming both gases behave ideally?

A. The helium sample contains more atom s than the argon sample and the helium atoms have a higher average speed.

B. The two samples have the same number of atoms but the helium atoms have a higher average speed.

C. The two samples have the same number of atoms and both types of atoms have the same average speed.

D. The two samples have the same number of atoms but the argon atoms have a higher average speed.

Answer: b

Watch Video Solution

230. A sample of gas measured at $20^\circ C$ C and 4.0 atm is heated to $40^\circ C$ at constant volume. Which statement(s) is (are) true of the gas after heating relative to its initial satate?

(P) The average molecular kinetic energy is increased.

(Q) The average molecular speed is unchanged.

(R) The pressure of the gas is increased to 8.0 atm.

(S) The number of molecular collisions per second is unchanged.

A. P only

B. P and S only

C. Q and R only

D. Q and S only

Answer: a

Watch Video Solution

231. The kinetic theory of gases assumes all of the following except:

A. Gases are composed of particles in random ceaseless motion.

B. The sizes of gas particles are negligible compared to the size of the container.

C. Gas particles do not attract or rapel each other.

D. When gas particles collide, kinetic energy is lost.

Answer: d

View Text Solution

232. With the increase in temperature of a gas, the fraction of molecules having velocities within a given range around the most probable velocity, would:

A. increase

B. decrease

C. remain unchanged

D. initially increase and then decrease

Answer: b

View Text Solution

233. Comment about the fraction of molecules moving between 400 to 500m/sec for a gas (molecular mass =20 g/mol) if its temperature increases from 300K to 400K [25/3 J/mol/K].

A. Fraction of molecules increases

B. Fraction of molecules decreases

C. Fraction of molecules remains constant

D. Fraction of molecuels remains constant

Answer: b

View Text Solution

234. Assuming ideal gas behaviour identify the option which is incorrect as per assumption involved in KTG, speed distribution and bimolecular collisions:

A. Lighter gases will have more uniform speed distribution pattern as compared to heavier gases at the same temperature.

B. All the molecuels of heavier gas will move at a slower speed as compared to any molecule of a lighter gas.

C. The average distance travelled between successive collisions will remain unchanged on changing temperature of a closed rigid vessel, containing ideal gas.

D. Average translational kinetic energy is directly proportional to absolute temperature.

Answer: b

Watch Video Solution

235. Incorrect postulate of kinetic theory of gases:

A. Gas particles move in random motion

B. Forces between gas molecules are negligible

C. Gas molecules with higher molar mass have more kineticn energy

D. Collision between gas molecules are elastic

Answer: c

Watch Video Solution

236. Equal masses of three non-reacting different ideal gases X,Y and Z are mixed in a sealed rigid container. If the temperature of the system remain constant at 400K, which of the system remain constant at 400K, which of the following statement about gas X can never be correct?

A. Its partial pressure can be equal to $1/3^{rd}$ of total pressure

B. Average kinetic energy per mole of gas X is highest

C. It can never be liquified

D. It's partial pressure can be calculated with knowledge of volume of the container and mole of X

Answer: b

Watch Video Solution

237. In kinetic theory of gases, only translational motion of molecules is considered because:

A. there is no intermolecular forces.

B. the molecules are considred rigid spheres of negligible volume.

C. different molecules may travel at different speeds

D. in normal conditions, rotational and vibrational motion is not observed in gas molecules.

Answer: b

View Text Solution

238. Which of the following is not a correct postulate of the kinetic molecular theory of gases ?

A. Gas particles have negligible volume.

B. A gas consists of many identical particles which are in continual motion.

C. At high pressure, gas particles are difficult to compress.

D. Collisions of gas particles are perfectly elastic.

Answer: c

Watch Video Solution

239. When a sample of an ideal gas is heated from $25^\circ C$ to $50^\circ C$ the average kinetic energy of the molecules increases. Which ratio gives the correct relationship between the average kinetic energies at the higher temperature to the lower temperature?

A. $2:1$

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

C. $323:298$

D. $\sqrt{323}:\sqrt{298}$

Answer: c

Watch Video Solution

240. The kinetic energy of the molecules in a sample of H_2O in its stable state at $-10^\circ C$ and 1 atm is doubled. What are the initial and final phases?

A. solid $\rightarrow$ liquid

B. liquid $\rightarrow$ gas

C. solid $\rightarrow$ gas

D. solid $\rightarrow$ solid

Answer: c

View Text Solution

241. Ar and He are both gases at room temperture. How do the average molecular velocities (V) of their atoms compare at this temperature?

A. $V_{He} = 10V_{Ar}$

B. $V_{Ar} = 10V_{He}$

C. $V_{He} = 3V_{Ar}$

D. $V_{Ar} = 3V_{He}$

Answer: c

View Text Solution

242. Suppose that we change U_{rms} of gas in a closed container from 5×10^{-2} cm/sec to 10×10^{-2} cm/sec, which one of the following might correctly explain how this change was acomplished?

A. By heating the gas we double the temperature.

B. By removing 75% of the gas at constant volume we we decrease the pressure to one equarter of its original value.

C. By heating the gas we quadruple the pressure.

D. By pumping in more gas at constant temperature we quadruple the pressure.

Answer: c

Watch Video Solution

243. At what temperature, will most probable speed of the molecules of the second member of homologous series C_n, H_{2n-2} be the same as that of oxygen at $527^\circ C$?

A. $1000^\circ C$

B. $727^\circ C$

C. $1727^\circ C$

D. $1044.5^\circ C$

Answer: b

View Text Solution

244. Which statement is not a principle (postulate) of kinetic molecular theory?

A. The molecules of a gas are in rapid random motion.

B. The molecules of an ideal gas exhibit. No attractive forces.

C. The collisions of gaseous molecules with one another and the walls of their container are elastic.

D. Equal volumes of gases at the same temperature and pressure contain equal numbers of molecules.

Answer: d

Watch Video Solution

245. If the absolute temperature of a sample of gas is increased by a factor of 1.5, by what ratio does the average molecular speed of the molecules increases?

A. 1.2

B. 1.5

C. 2.2

D. 3.0

Answer: a

View Text Solution

246. Which property is the same for 1.0g samples of H_2 and CH_4 in separate 1.0L containers at $25^\circ C$?

A. Pressure in I is the maximum.

B. Number of molecules

C. Average molecular velocity

D. Average molecular kinetic energy

Answer: d

View Text Solution

247. Fraction of molecules (η) are related with velocity according to relation

$$\eta' = -\frac{3}{4}v^2 + 3v - \frac{9}{4}(1 \leq v \leq 3)$$

Then find most probable speed?

A. 0

B. 1

C. 2

D. 3

Answer: c

View Text Solution

248. What is the average velocity of H_2 molecules at 100K relative to their velocity at 50K?

A. 2.00 times the velocity at 50K

B. 1.41 times the velocity at 50K

C. 0.71 times the velocity at 50K

D. 0.50 times the velocity at 50K

Answer: b

View Text Solution

249. The quantity that does not change for a sample of a gas in a sealed rigid container when. It is cooled from $120^{\circ}C$ to $90^{\circ}C$ at constant volume is:

A. average energy of the molecule

B. pressure of the gas

C. density of the gas

D. average speed of the molecules

Answer: c

View Text Solution

250. Three balloons are filled with the same number of atoms of He, Ar and Xe, respectively. Which statement is true under the same conditions of temeprature and pressure?

A. The balloons contain the same mass of gas.

B. All balloons have the same volume.

C. The densities of the three gases are the same.

D. The average speed of the different types of atoms is the same.

Answer: b

Watch Video Solution

251. 6×10^{22} gas molecules each of mass $10^{-24} kg$ are taken in a vessel of 10 litre. What is the pressure exerted by gas molecules? The average velocity of the gas molecules is 92.62m/sec.

A. $2 \times 10^{5} Pa$

B. 20Pa

C. $2 \times 10^6 Pa$

D. $2 \times 10^4 Pa$

Answer: d

View Text Solution

252. Certain amount of a gas exerts some pressure on its walls at a particular temperature. It hasa been found.that by reducing the volume of the gas to $\frac{1}{4}$ of its original value the pressure becomes 4 times that of the initial value of constant temperature. this happens because:

A. Weight of the gas increase the 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

Watch Video Solution

253. Ratio of fraction of molecules of O_2 and SO_2 which lies between U_{rms} to $U_{\text{rms}} +$ du at same temperature is:

A. 1

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

C. $\frac{3}{2\sqrt{e}}$

D. $\frac{2}{3e}$

Answer: b

View Text Solution

254. Pick out correct statement among the following about the equal volume of $N_2(g)$ and $O_2(g)$ at 298K and 1 atm:

A. The average translational kinetic energy per molecule is same of

$N_2(g)$ and $O_2(g)$

B. The most probable speed of two gases is same

C. The toal translational kinetic energy of $N_2(g)$ and $O_2(g)$ is same

D. The absolute entropy of both gases is same.

Answer: a

View Text Solution

255. Fraction of oxygen molecules $\left(\frac{dN}{N}\right)$ in the range U_{mps} to $U_{\text{mps}} + fU_{\text{mps}}$ whre $f < \; < 1$d:

A. $\frac{4f}{2\sqrt{\pi}}$

B. $\frac{4}{\sqrt{\pi}}\left(\frac{M}{2RT}\right)^{1/2} e^{-1}$

C. $\frac{f}{e\pi}$

D. 1

Answer: a

View Text Solution

256. Identify the correct statement when a fixed amount of ideal gas is heated in a container fitted with a movable piston always operating at constant pressure.

A. Average distance travelled between successive collisions will decrease.

B. Collisions frequency increases since speed of the molecules increases with increase in temperature.

C. Average relative speed of approach remains unaffected.

D. Average angle of approach remains unaffected.

Answer: d

Watch Video Solution

257. When a gas is compressed at constant temperature

A. the speeds of the molecules increase

B. the collisions between the molecules increase

C. the speeds of the molecules decrease

D. the collisions between the molecules decrease

Answer: b

View Text Solution

258. At constant volume Z_{11} is directly proportional to:

A. $\sqrt{P}$

B. P

C. T^2

D. T

Answer: a

View Text Solution

259. An unknown gas is placed in a sealed container with a fixed volume. Which of the characteristics listed change(s) when the container is heated from $25^\circ C$ to $250^\circ C$?

(P) The density of the gas

(Q) The average kinetic energy of the molecules

(R) The mean free path between molecular collisions

(R) The mean free path between molecular collisions

A. P only

B. Q only

C. R only

D. P and Q only

Answer: b

View Text Solution

260. Choose the correct alternative (more than one may be correcT) (B.M.C=Bimolecular collision) (at constant P) (n is constant throughout).

A. λ is constant.

B. BMC made by 1 molecule per second is directly proportional to T.

C. BMC for all the molecuels per unit volume is directly proportional to T^2

D. none of these

Answer: d

Watch Video Solution

261. The most probable kinetic energy of a gas molecule

A. $\frac{kT}{2}$

B. kT

C. 2kT

D. RT

Answer: a

View Text Solution

262. A real gas obeying van der Walls's equation will resemble ideal gas, if the:

A. constants a and b are small

B. a is large and b is small

C. a is smal and b is large

D. constant a and b are large

Answer: a

View Text Solution

263. For the non-zero value of the force of attraction between gas molecules, gas equation will be

A. $PV = nRT - \frac{n^2 a}{V}$

B. $PV = nRT + nbP$

C. $PV = nRT$

D. $P = \frac{nRT}{V - b}$

Answer: a

Watch Video Solution

264. Compressibility factor for H_2 behaving as real gas is:

A. 1

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

C. $\left(1 + \frac{Pb}{RT}\right)$

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

Answer: c

Watch Video Solution

265. At low pressures (for 1 mole), the van der Waal's equation is written as $\left[P+\dfrac{a}{V^2}\right]V = RT$

The compressibility factor is then equal to :

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

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

C. $\left(1+\dfrac{a}{RTV}\right)$

D. $\left(1+\dfrac{RTV}{a}\right)$

Answer: a

Watch Video Solution

266. Calculate the radius of He atoms if its van der Waal's constant 'b' is 24mL mol^{-1}. (Note: mL=cubic centimeter)

A. $1.334\overset{\circ}{A}$

B. $1.314\overset{\circ}{A}$

C. $1.255\overset{\circ}{A}$

D. $0.355\overset{\circ}{A}$

Answer: a

Watch Video Solution

267. In van der Waal's equation of state for a non ideal gas the term that accounts for i9ntermolecular forces is:

A. nb

B. nRT

C. $\frac{n^2a}{V^2}$

D. $(nRT)^{-1}$

Answer: c

Watch Video Solution

268. The values of van der Waal's constant 'a' for the gases O_2, N_2, NH_3 and CH_4 1.36,1.39,4.17,2.253L^3 atm mole^{-2} respectively. The gas which can most easily be liquefied is:

A. O_2 and N_2

B. N_2 and O_2

C. NH_3

D. CH_4

Answer: c

Watch Video Solution

269. The correct order of normal boiling of O_2, N_2, NH_3 and CH_4 for whom the values of van der Waals constant $'a'$ are $1.360, 1.390, 4.170$ and $2.253 L^2 atm mol^{-2}$ respectively, is:

A. $O_2 < N_2 < NH_3 < CH_4$

B. $O_2 < N_2 < CH_{\$} < NH_3$

C. $NH_3 < CH_4 < N_2 < O_2$

D. $NH_3 < CH_4 < O_2 < N_2$

Answer: b

Watch Video Solution

270. NH_3 is liquefied more easily than N_2. Hence

A. van der Waal's constants 'a' and 'b' of $NH_3 >$ that of N_2

B. van der Waal's constants 'a' and 'b' of $NH_3 <$ that of N_2

C. $a(NH_3) > a(N_2)$ but $b(NH_3) < b(N_2)$

D. $a(NH_3) < a(N_2)$ but $b(Nh_3) > b(N_2)$

Answer: c

Watch Video Solution

271. Four different identical vessels at same temperature contains one mole each of C_2H_6, CO_2, Cl_2 and H_2S at pressure P_1, P_2, P_3 and P_4 respectively. The value of van der Waal's constnat 'a' for C_2H_6, CO_2, Cl_2 and H_2S is 5.562,3.640,6,579 and 4.490 atm $L^2\text{mol}^{-2}$ respectively. Then:

A. $P_3 < P_1 < P_4 < P_2$

B. $P_1 < P_3 < P_2 <_4$

C. $P_2 < P_4 < P_1 < P_3$

D. $p_1 = p_2 = p_3 = p_4$

Answer: a

View Text Solution

272. Under critical states of a gas for one mole of a gas, compressibility factor is :

A. $\frac{3}{8}$

B. $\frac{8}{3}$

C. 1

D. $\frac{1}{4}$

Answer: a

Watch Video Solution

273. Critical temperature of a gas is.... Boyle's temperature.

A. higher than

B. equal to

C. lower than

D. no relation

Answer: c

Watch Video Solution

274. At low pressure of 0.25 atm, 2 mole of a real gas has Boyl's temperature 100K. The approximate volume of gas at this temperature and pressure is:

A. 66 litre

B. 33 litre

C. 44.8litre

D. none of these

Answer: a

View Text Solution

275. One litre gas at 400K and 300atm pressure is compressed to a pressure of 600 atm and 100K. The compressibility factor is changed from 1.2 to 1.6 respectively. Calculate the final volume of the gas.

A. 2 litre

B. $\frac{2}{3}$ litre

C. $\frac{1}{3}$ litre

D. $\frac{4}{3}$ litre

Answer: c

View Text Solution

276. Consider the following statements:

(I) $(a)_{NH_3} > (a) + (H_2O)$ [(a) is van der Waal's constant]

(II) Pressure of the real gas is more than the ideal gas for same temperature and volume of the container.

(III) Compressibility factor for $H_2(g)$ is never less than unity at any temperature. The above statements 1,2,3 respectively are (T=True,F=False)

A. T F F

B. F F F

C. F T F

D. T T F

Answer: b

Watch Video Solution

277. The critical pressure P_C and critical temperature T_C for a gas obeying van der Waal's equation are 80 atm at 87°C. molar mass of the gas is 130 g/mole. The compressibility factor for the above gas will be smaller than unity under the following condition:

A. 1 atm and $800^{\circ}C$

B. 1 atm and 1200°

C. 1 atm and $1000^\circ C$

D. 1 atm and $1100^\circ C$

Answer: a

Watch Video Solution

278. For the four gases A,B,E and D the value of the excluded volume per mole is same. If the order of the critical temperature is $T_B > T_C > T_A > T_E$ then the order of their liquefaction pressure at a temperature $T(T < T_E)$ will be:

A. $P_A < P_B < P_E < P_D$

B. $P_B < P_D < P_A < P_E$

C. $P_E < P_A < P_D <_B$

D. $P_D < P_E < P_A < P_B$

Answer: b

View Text Solution

279. Which of the following options will have compressibility factor greater than 1?

A. H_2 gas at its critical condition.

B. CH_4 gas at room temperature and low pressure.

C. N_2 gas at Boyle's temperature and low pressure.

D. He gas at normal temperature and normal pressure.

Answer: d

View Text Solution

280. The density of CO_2 at 10 atm and 400K is 22g/L. the dominant force between CO_2 gas molecules is:

A. attractive

B. repulsive

C. neithrer attractive nor repulsive

D. can't be predicted

Answer: a

View Text Solution

281. At moderate pressures, the compressibility factor of a gas is given by:

$Z = 1 + 0.4P - \frac{200P}{T}$ (P in bars and T in Kelvin)

The Boyle's temperature is given by:

A. 200K

B. 500K

C. $\frac{2400}{27}K$

D. 400K

Answer: b

View Text Solution

282. Which of the following options regarding true/false statement for a van der Waal's gas is correct? Statement-1 : At critical condition, the gas will follow the equation 8 PV=3nRT

Statement-2: At Boyle's temperature, Z=1 at all pressures.

Statement-3: Greater the size of molecuels, greater will be the vander Waal's constnat 'b'.

Statement-4: For H_2 gas, if P=200 atm and T=300K,Z > 1.

A. Al the statements are correct

B. Only statement-2 is incorrect.

C. Statement-1 and Statement-2 a re incorrect statements.

D. State,emts-1 and Statement-4 are incorrect statements.

Answer: b

Watch Video Solution

283. Which of the following statements is not correct regarding compressibility factor of real gas?

A. At Boyle's temperature compressibility factor can be 1.04 at some pressures.

B. For a gas in which only repulsive forces are existing and are significant, 'z' will always the greater than 1.

C. As pressure tends to zero compressibility factor of all real gases approaches towards unity.

D. At Boyl's temperature compressibility factor be 0.96 at some pressure.

Answer: d

Watch Video Solution

284. What will be the nature of forces at critical conditions for a real gas?

A. Attractive

B. Repulsive

C. No net dominant forces

D. Depends on the types of the gas, attractive for most of them and repulsive for H_2 and He.

Answer: a

View Text Solution

285. van der Waal's constants for gases A,B and C are as follows:

Gas	$a\left(\text{kPa}\ \ dm^6\text{mol}^{-2}\right)$	$B(L/mol)$
A	410	0.027
B	1215	0.03
C	608	0.032

Which of the following options contain correct arrangement of "gas with highest critical temperature" ad "gas with most ideal behaviour around $1850K$" respectively?

A. B,A

B. A,B

C. C,B

D. B,C

Answer: a

Watch Video Solution

286. For a hypothetical gas containing molecules as point masses and having non-zero intermolecular attractions, which of the following is correct?

A. The gas shows positive deviations from ideal gas behaviour.

B. Graph of Z v/s $\frac{1}{V}$ at a particular temperature will have negative slope

C. The gas will be difficult to compress as compared to ideal gas.

D. 2 moles of the gas at a temperature of 273K can be stored in a 45 litre of container at 1 atm pressures.

Answer: b

Watch Video Solution

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

A. 15 atm and 200K

B. 1 atm and 273 K

C. 0.5 atm and 500K

D. 15 atm and 500K

Answer: c

View Text Solution

288. Calculate the compressibiity factor for CO_2, if one mole of it occupies 0.4 litre at 300K and 40 atm. Comment on the result.

A. 0.40, CO_2 is more compressible than ideal gas

B. 0.65,CO_2 is more compressible than ideal gas

C. 0.55,CO_2 is more compressible than ideal gas

D. 0.62,CO_2 is more compressible than ideal gas

Answer: b

View Text Solution

289. Which of following statement(s) point is maximum.

(P) Slope of isotherm at critical point is maximum.

(Q) Larger is the value of T_c easier is the liquification of gas.

(R) van der Waal's equation of state is applicable below critical temperature at all pressure.

A. Only P

B. P andQ

C. Q and R

D. Only Q

Answer: b

View Text Solution

290. Consider the following statements: The coefficient B in the virial equation of state

(P) is independent of temperature

(Q) is equal to zero at boyle temperature

$$PV_m = RT\left(1 + \frac{B}{V_m} + \frac{C}{V_m^2} + \ldots\ldots\right)$$

(R) has the dimension of molar volume which of the above statement are correct?

A. P and Q

B. P and R

C. Q andR

D. P,Q and R

Answer: c

View Text Solution

291. Consider the following statements : if the van der Waal's parameters of two gases are given as:

$$a\left(\text{atm}L^2\text{mol}^{-2}\right)b\left(L\text{mol}^{-1}\right)$$

$$\begin{array}{lll} \text{Gas X:} & 6.5 & 0.056 \\ \text{Gas Y:} & 8.0 & 0.011 \end{array}$$

(P): $V_C(X) < V_C(Y)$ (Q): $P_C(X) < P_C(Y)$

(R) : $T_C(X) < T_C(Y)$

Select the correct alternate.

A. Only P

B. P and Q

C. P,Q andR

D. Q are R

Answer: d

Watch Video Solution

292. Select correct statement(s).

A. we can condense vapours simply by applying pressure

B. To liquefy a gas one must lower the temperature below T_C and also apply pressure

C. At T_C, there is no distinction betwwen liquid and vapour state, hence density of the liquid is nearly equal to density of the vapour

D. All the statements are correct.

Answer: d

Watch Video Solution

293. At Boyle's temperature the value of compressibility factor $Z = (PV_m / RT = V_{\text{real}} / V_{\text{ideal}})$ has a value of 1, over wide range of pressure. This is due to the fact that in the van der Waal's equation:

A. the constant 'a' is negligible and not 'b'

B. the constant 'b' is negligible and not 'a'

C. both the constant 'a' and 'b' are negligible

D. the effect produced due to the molecular attractions compensates the effect produced due to the molecular volume.

Answer: d

View Text Solution

294. The critically density of the gas CO_2 is 0.44 g cm^{-3} at a certain temperature, if r is the radius of the molecule, r^3 in cm^3 is approximately: (N is Avogadro number)

A. $\frac{25}{\pi N}$

B. $\frac{100}{nN}$

C. $\frac{6}{\pi N}$

D. $\frac{25}{\pi N}$

Answer: d

View Text Solution

295. The compressibility of a gas is less than unity at S.T.P

A. $V_m > 22.7$ litres

B. $V_m > 22.7$ litres

C. $V_m = 22.7$ litres

D. $V_m = 45.4$ litres

Answer: c

View Text Solution

296. The term that corrects for the attractive forces present in a real gas in the van der Waal's equation is:

A. nb

B. $\frac{an^2}{V^2}$

C. $-\frac{an^2}{V^2}$

D. $-nb$

Answer: b

View Text Solution

297. On heating vapours of $S_8(g)$ decomposes to $S_2(g)$, Due to this, the van der Waal's constant 'b' for the resulting gas:

A. increases

B. decreases

C. remains same

D. changes unpredictably

Answer: b

View Text Solution

298. Three gases A,B and C have values of van der Waal's constnat, a (in units of $\text{litre}^3 \text{mol}^{-2}$ atm) of 1.38,6.70 and 4.00 respectively. The ease of liquefaction of gases decreases in the order:

A. $B > A > C$

B. $B > C > A$

C. $A > B > C$

D. $C > A > B$

Answer: b

View Text Solution

299. van der Waal's constants for neon and hydrogen are (a_1, b_1) and (a_2, b_2) respectively. The maximum number of moles of neon which will form a homogeneous mxture with n_2 moles of hydrogen at $25^\circ C$ and constant pressure P is:

A. $4n_2 \frac{Pb_2^2}{a_2}$

B. $27n_2 \frac{Pb_2^2}{a_2}$

C. $27n_2 \frac{Pb_1^2}{a_1}$

D. ∞

Answer: b

Watch Video Solution

300. The compressibility factor of $H_2(g)$ at its critical condition if it follows van der Waals' equation is given by:

A. $Z > 1$

B. $Z = 1$

C. $Z = \frac{3}{8}$

D. $Z = \frac{1}{8}$

Answer: c

Watch Video Solution

301. In van der Waals' equation of state of the gas law, the constnat 'b' is a measure of :

A. intermolecular collisions per unit volume

B. intermolecular attractions

C. volume occupied by the molecules

D. intermolecular repulsions

Answer: c

View Text Solution

302. The critical temperature of water is the

A. temperature at which solid, liquid and gaseous water coexist.

B. temperature at which water vapour condenses.

C. maximum temperature at which liquid water can exit.

D. minimum temperature at which water vapor can exist.

Answer: c

Watch Video Solution

303. 10 litre container contains He at 210 atm and 300K. Given value of 'b' for 'He' is 0.8 $dm^3 \text{mol}^{-1}$ Compressibility factor is $\left(R = 0.08 \text{atm} L \text{mol}^{-1} / K^{-1}\right)$

A. 1.4

B. 1.7

C. 0.7

D. 0.4

Answer: b

Watch Video Solution

304. The phase transition from gas to solid is called:

A. deposition

B. desublimation

C. both a and b

D. sublimation

Answer: a

Watch Video Solution

305. The critical temperature of carbon dioxide is 304.3K. Which statement is true about the behaviour of carbon dioxide above this temperature?

A. Solid, liquid and gaseous carbon dioxide are in equilibrium above this temperature.

B. Liquid carbon dioxide does not exist above this temperature.

C. Carbon dioxide molecules do not exist above this temperature.

D. none of these

Answer: c

Watch Video Solution

306. Which statement is correct about the critical point of a phase diagram?

A. Solid, liquid and gas are present in equilibrium.

B. Liquid and vapour are indistinguishable from one another.

C. Liquid can be produced by a change in pressure.

D. Vapour can be produced by a change in temperature.

Answer: b

View Text Solution

307. CH_4 gas is behaving non-ideally. Compressibility factor for gas is 1.5 at 2 atm, 400K. Calculate molar volume for gas: [Given: $R = 0.08 \dfrac{\text{Litre—atm}}{K - \text{mole}}$]

A. 24 litre

B. 16 litre

C. 48 litre

D. 8 litre

Answer: a

View Text Solution

308. Under what conditions does the behavior of real gases deviate most from that predicted by the ideal gas law?

A. low P,low T

B. high P,lw T

C. low P, high T

D. high P,high T

Answer: b

Watch Video Solution

309. At the critical condition $(T = T_C, P = P_C, V = V_C)$, the only incorrect information is:

A. The sruface differentiating liquid and gaseous phases disappears.

B. The density of matter in liquid and gaseous state becomes equal.

C. The compressibility factor of real gases becomes $\frac{8}{3}$.

D. The intermolecular attraction betwwen gas molecules still dominates.

Answer: c

Watch Video Solution

310. Select the correct statement with reference to van der Waal's ga.

A. The compressibility factor for gas at critical state is $\frac{8}{3}$

B. At critical temperature, real gas behave like an ideal gas

C. At Boyle's temperature, real gas behaves like an ideal gas at all pressure

D. At Boyle's temperature, gas cannot be liquefied

Answer: d

Watch Video Solution

311. Boyle's temperature of a van der Waal's gas is 810K then at $-30^{\circ} C$, select the correct observation.

A. Gas can be liquified at any pressure

B. Gas behaves ideally at all pressures

C. Gas can't be liquified at any pressure

D. Gas behaves ideally at high pressure

Answer: c

Watch Video Solution

312. Correct option regarding a container containing 1 mole of a gas in 22.4 litre contaienr at 273 K is:

A. If compressibility factor $(z) > 1$ then P will be less than 1 atm.

B. If compressibility factor $(z) > 1$ then P will be greater than 1 atm.

C. If b dominates, pressure will be less than 1 atm.

D. If a diominates, pressure will be greater than 1 atm.

Answer: b

Watch Video Solution

313. In the van der Waal's equation for real gases, corrections are introduced for both the pressure and the volume terms of the Ideal Gas Equation. Identify the origin of both correction factors and specify whether each is added to or subtracted from the corresponding ter.

A. $\begin{array}{ll}\text{Pressure} & \text{Volume} \\ \text{(a) attractive forces/subtracted} & \text{molecular size/added}\end{array}$

B. $\begin{array}{ll}\text{Pressure} & \text{Volume} \\ \text{(b)attractive forces/added} & \text{molecular size/subtracted}\end{array}$

C. $\begin{array}{ll}\text{Pressure} & \text{Volume} \\ \text{(c)molecular size/subtracted} & \text{attractive forces/added}\end{array}$

D. $\begin{array}{ll}\text{Pressure} & \text{Volume} \\ \text{(d)molecular size/added} & \text{attractive forces/subtracted}\end{array}$

Answer: b

Watch Video Solution

314. What is the most effective way to condense a gas?

A. Decrease the temperature and increase the pressure.

B. Decrease the temperature and decrease the pressure.

C. Increase the temperature and decrease the pressure

D. Increase the temperature and increase the pressure.

Answer: a

Watch Video Solution

315. The volume of real gases often exceed those calculated by the ideal gas equation. These deviations are best attributed to the:

A. attractive forces between the molecuels in real gases.

B. dissociation of the molecuels in real gases.

C. kinatic energy of the molecules in real gases.

D. volumes of the molecules in rel gases.

Answer: d

Watch Video Solution

316. When the temperature of a sample of H_2S gas is lowered, the pressure decreases more than predicted by the ideal gas equation. To what is this deviation from expected behaviour due?

(P) attractive forces between molecules

(Q) mass of the molecuels

(R) Volume of the molecules

A. P only

B. Q only

C. P and R only

D. Q and R only

Answer: a

Watch Video Solution

317. The third virial coefficient of a real gas $2 \times 10^{-2}(L/\text{mol})^2$. The value of van der Waals' constant 'b' is:

A. 0.1414 L/mol

B. 0.707 L/mol

C. 0.2828 L/mol

D. none of these

Answer: a

Watch Video Solution

318. Select the incorrect statement(s).

A. At critical conditions, volume occupied by the gas 12 times the volume of 1 mole gaseous molecuels

B. A gas can be liquefied above its T_b (Boyle's temperature) by application of pressure.

C. At very high pressure and moderate temperature, the volume of a moles of real gas is equal to $\frac{nRT}{P} + nb$

D. For a real gas, follwowing equation $\left(P + \frac{a}{TV^2}\right)(V - \beta) = RT$, wehre α and β are constant: Boyle's temperature is $\sqrt{\frac{\alpha}{R\beta}}$

Answer: b

View Text Solution

319. For a real gas, behaving ideally, the pressure may be:

A. ab V_{molar}

B. $\frac{V_{\text{molar}}}{ab}$

C. $\frac{a}{V_{\text{molar}}b}$

D. $\frac{b}{aV_{\text{molar}}}$

Answer: c

Watch Video Solution

320. The value of 'a' for NH_3 is greater than that of N_2. This means:

A. NH_3 has greater size

B. NH_3 has greater attractions

C. NH_3 has smaller size

D. NH_3 has smaller attractions

Answer: b

Watch Video Solution

321. Attractive forces between non-polar, real gas molecules are:

A. short-range interactions

B. inversely proportional to the sixth power of the distance between two interacting particles

C. Important only at short distance (-500pm)

D. all of the above

Answer: a

View Text Solution

322. n moles of helium gas are placed in a vessel of volume V Litre, at T K.

If V_1 is free volume of helium then diameter of He atom is:

A. $\left[\frac{3}{2}\frac{V_1}{\pi N_A n}\right]^{1/3}$

B. $\left[\frac{3(V-V_1)}{2\pi N_A n}\right]$

C. $\left[\frac{6(V-V_1)}{\pi N_A n}\right]^{1/3}$

D. $\left[\frac{6V_1}{nN_An}\right]^{1/3}$

Answer: b

Watch Video Solution

323. Select the incorrect option for van der Waal's gas.

A. He has smaller 'a' (van der Waals' constant) than Ne,Kr,Ar,CO_2, CH_4 and NH_3

B. He hs smaller 'b' (van der Waals' constant)than Ne,Kr,Ar,CO_2, CH_4 and NH_3

C. At 273K and 1 atm, He moecules have attractions with respect to ideal behaviour

D. At 273 K and 1 atm He molecules have repulsions with respect to ideal behaviour

Answer: c

View Text Solution

324. Which relationship does hold good for van der Waals' gas under all conditions where all terms have their usual meaning?

A. $PV = nRT$

B. $\left(P + \frac{a}{n^2V^2}\right)(V - nb) = nRT$

C. $\left(P + \frac{a}{V_m^2}\right)(V_m - b) = RT$

D. $\left(P + \frac{a^2n}{V^2}\right)(V - nb) = nRT$

Answer: c

View Text Solution

325. At critical temperature:

A. liquid passes into gaseous state imperceptibly and continously

B. gas passes into liquid state imperceptibly and continously

C. surface separating two phases disappears

D. all of the above

Answer: d

View Text Solution

326. Select the incorrect option.

A. At extremely low pressure and high temperature, gases behave ideally.

B. At Boyle's temperature , gases behave ideally in low pressure region.

C. If a gas is kept at $T > T_C$. It can never be liquefied.

D. Gas is more compressible if repulsive forces dominate over attractive forces between molecules.

Answer: d

Watch Video Solution

327.

Gas	H_2	He	O_2	N_2
Critical temp. ink	33.2	5.3	154.3	126

From the above data, what would be the order of liquefication of these gases? Start writing the order for the gas which liquefies first:

A. H_2, H, O_2, N_2

B. H_2, O_2, H_2, N_2

C. N_2, O_2, He, H_2

D. O_2, N_2, H_2, He

Answer: d

Watch Video Solution

328. Critical constants for a real gas are given as

$T_C = 180K,$

$V_C = 0.123\frac{L}{\text{mole}}$

$P_C = 45$ atm,

the correct statement for the real gas is:

A. The actual volume of single gas molecule is $\left(\frac{0.123 \times 10^{-3}}{6023 \times 10^{23}}\right)$

B. $b = 3 \times 0.123 L \text{mol}^{-1}$

C. The Boyle's temperature is less than 180K

D. Gas cannot be liquefied at 200K

Answer: d

View Text Solution

329. The third virial coefficient of He gas is $4 \times 10^{-2} (L/\text{mol})^2$, then what will be volume of 2 mole He gas at 1 atm and 273 K?

A. 22.0L

B. 44.0L

C. 44.8L

D. 45.2L

Answer: d

View Text Solution

330. If two gases have same value of a but different values of b(a and b are van der Waal's constant) which of the following statement is wrong?

A. The gas having smaller value of B has larger copressibility

B. the gas having smaller value of b will occupy lesser volume

C. The gas having smaller value of b has lesser compressibility

D. Both a and b

Answer: c

View Text Solution

331. Number of N_2 molecules present in 1 litre of vessel at 1 atm, 273K when compressibility factor is 1.2.

A. 2.23×10^{24}

B. 2.23×10^{22}

C. 2.7×10^{22}

D. 2.7×10^{24}

Answer: b

View Text Solution

332. Statement-1: Distribution pattern of speed will be more uniform for H_2 as compared to O_2.

Statement-2: Fraction of molecules having speed equal to U_{mps} will be more in case H_2 than O_2 at same T.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: c

Watch Video Solution

333. Assertion: Absolute zero temperature is a theoretically possible temperature at which the volume of the gas becomes zero.

Reason: The total kinetic energy of molecules is zero at this temperature.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: b

Watch Video Solution

334. Statement-1: 10g of $CaCO_3$ on heating gave 2.27L CO_2 at STP and 0.1 mol non-volatile residue.

Statement-2: Total moles of reactant and products always remain conserved in a chemical reaction.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: c

Watch Video Solution

335. Statement-1: Gas with lower molar mass will effuse or diffuse faster.

Statement-2: Total kinetic Energy of any gas depednds upon its molar mass.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: b

Watch Video Solution

336. Assertion: Pressure exerted by a mixture of gases is equal to the sum of their partial pressure.

Reason: Reacting gases react to form a new gas having pressure equal to the sum of both.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: c

Watch Video Solution

337. Statement-1: CH_4, CO_2 has value of Z (compressibility factor) less than one, generally. Statement-2: $Z < 1$ is due to repulsive forces among the molecules.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: c

Watch Video Solution

338. Statement-1: Critical temperature of the gas is the temperature at which it occupies 22.7L of volume.

Statement-2: Molar volume of every gas at STP is 22.7L.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: c

Watch Video Solution

339. Statement-1: Excluded volume or co-volume equals to (V-nb) for n moles gas.

Statement-2: co-volume depends on the effective size of gas molecules.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: d

Watch Video Solution

340. Statement-1: Gases like N_2, O_2 behave as ideal gases at high temperature and low pressure.

Statement-2: Molecular probable velocity is the velocity possessed by maximum fraction of molecules at the same temperature.

Statement-2:Molecular interactions diminish at high temperature and low pressure.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: a

Watch Video Solution

341. Assertion: Most probable velocity is the velocity possessed by maximum fraction of molecules at the same temperature.

Reason: On collision, more and more molecules acquire higher speed at the same temperature.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: c

Watch Video Solution

342. Statement-1: Noble gases can be liquefied.

Statement-2: Molecular mass of nitrogen is smaller than that of oxygen.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: a

Watch Video Solution

343. Statement-1: The diffusion rate of oxygen is smaller than that of nitrogen under same conditions of T and P.

Statement-2: Molecular mass of nitrogen is smaller than that of oxygen.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: a

Watch Video Solution

344. Statement-1: The density of an ideal gas doubles when the pressure of the gas is doubled in a closed and rigid system.

Statement-2: Density of an ideal gas is directly proportional to pressure at constant temperature.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: d

Watch Video Solution

345. Statement-1: The total kinetic energy of vapours formed over liquid $H_2O(l)$ in two closed container A and B having free space 1 litre and 2 litre respectively over $H_2O(l)$ at the same temperature is in the ratio 1:2. (Assuming ideal gas behaviour of vapours).

Statement-2: Vapour pressure of a substance depends only on temperature.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: a

Watch Video Solution

346. Statement-1: A gas from a flask is allowed to effuse through a pinhole, rate of effuison decreases lineary with time.

Statement-2: With time, gas pressure in flask decreases.

A. Statement-I is True, Statement-II is True : Statement-II is a correct explanation for Statement-I

B. Statement-I is True, Statement-II is True : Statement-II is NOT a correct explanation for Statement-I

C. Statement-I is True, Statement-II is False.

D. Statement-I is False, Statement-II is True.

Answer: d

Watch Video Solution

347. At the same temperature and pressure, which of the following will have same kinetic energy per mole as N_2O?

A. He

B. H_2S

C. CO_2

D. NO_3

Answer: a,b,c,d

Watch Video Solution

348. At the same T and P, which of the following gases will have the highest average kinetic energy per mole? (at.wt. : H=1,C=12,O=16,S=32,F=19)

A. H_2

B. O_2

C. CH_4

D. SF_6

Answer: a,b,c,d

Watch Video Solution

349. The van der Waal's gas constant 'a' is given by:

A. $\frac{1}{3}V_C$

B. $3P_CV_C^2$

C. $\frac{1}{8}\frac{RT_C}{P_C}$

D. $\frac{27}{64}\frac{R^2T_C^2}{P_C}$

Answer: b,d

View Text Solution

350. Critical temperature for a particular gas is $-177^\circ C$ then for which of the following case value of compresibility factor of the gas may be more than unity?

A. At $0^\circ C$ and 0.01atm

B. AT $0^\circ C$ and 2000 atm

C. At $60^\circ C$ and 0.01 atm

D. At $60^\circ C$ and 10 atm

Answer: b,c,d

View Text Solution

351. A small capillry tube of length 100cm closed at one end is kept horizontally and a mercury column of length 10cm is exactly in the middle. If the atmospheric pressure is 1 atm then identify the correct option(s).

A. The pressure of "air trapped" in the orgina: horizontal position is 750mm of Hg.

B. The length of the air trapped when the tube is held vertically with open end upwards is $\frac{45 \times 76}{86} cm$.

C. The length of the air trapped when the tube is held vertically with open end downwards is $\frac{45 \times 76}{66} cm$.

D. No air will be trapped when it is held vertically with open end downward.

Answer: b,c

Watch Video Solution

352. Chlorofluorocarbons such as CCl_3F (molecular mass=137.5) and CCl_2F_2 (molecular mass=121) have been linked to ozone depletion in Antarctica. A research reported that the concentration of these gases are 240 and 800 parts per trillion (10^{12}), by volume respectively. what are the concentrations of these gases (in moles per litre). under conditions typical of Antarctic stratosphere (200K and 0.05 atm)? (R=0.08L-atm/K-mol)

A. $[CCl_3F] = 7.5 \times 10^{-13}$ mol/L

B. $[CCl_3F] = 1.75 \times 10^{-12}$ mol/L

C. $[CCl_2F_2] = 2.5 \times 10^{-12}$ mol/L

D. $[CCl_2F_2] = 6.6 \times 10^{-12}$ mol/L

Answer: a,c

Watch Video Solution

353. A galss tube, Ad, of uniform cross section area, is 88cm long. When the tube is horizontal, it contains two air columns AB (10cm) and CD (40cm), separated by mercuy column BC (38cm), when the tube is kept vertical with end "A" up, the mercury column moves downward by 5 cm. The correct statement(s) regarding the tube is/are:

A. End A of tube is open but end D is closed

B. End A of tube is closed but end D is open.

C. Both the ends of tube is closed.

D. When the tube is kept vertical with end D up, the mercury column will move downward by less than 5 cm.

Answer: c,d

Watch Video Solution

354. A student collected two values of P,V_m for a gas at two different temperature (V_m is the molar volume of gas)

$P.\,V_m(L-atm)$	20	20
$\text{Temperature}(.^\circ C)$	30	300

He considered the gas ideal. Which of the following correct values, he will get on applying ideal gas equation?

A. $0K = -273^\circ c$

B. $0K = -240^\circ C$

C. $R = 0.0821L - \text{atm} / K - \text{mol}$

D. $R = 0.0741L - \text{atm} / K - \text{mol}$

Answer: b,d

Watch Video Solution

355. The temperature of a certain mass of a gas increased from $37^\circ C$ to $38^\circ C$. The volume of the gas will.....by 1/273 of its volume at ......Assume constant pressure.

A. decrease, $37^\circ C$

B. increase, 273K

C. increase, 310K

D. decrease,273K

Answer: b

Watch Video Solution

356. For gaseous state which of the following is incorrect?

A. Thermal energy =Molecular attraction

B. Thermal energy $>>$ Molecular attraction

C. thermal energy $<<$ Molecular attraction

D. Molecular force $>>$ Attraction in liquid.

Answer: a,c,d

Watch Video Solution

357. The rate of diffusion of 2 gases 'A' and 'B' are in the ratio 16:3. If the ratio of their masses present in the mixture is 2:3, then:

A. The ratio of their molar masses is 16:1

B. The ratio of their molar masses is 1:4

C. The ratio of their moles present inside the container 1:24

D. The ratio of their moles present inside the container 8:3

Answer: b,d

View Text Solution

358. If a gas is allowed to expand at constant temperature then which of the following does not hold true?

A. the kinetic energy of the gas molecules decreases

B. the kinetic energy of the gas molecules increases

C. the kinetic energy of the gas molecules increases

D. Cannot be predicted unless volumes of the gases are given

Answer: a,b,c,d

Watch Video Solution

359. Which of the following are correct statements?

A. van der Waals, constant 'a' is a measure of attractive force

B. van der Waals' constant 'b' is also called co-volume or excluded volume

C. b' is expressed in $L\text{mol}^{-2}$

D. a' is expressed in atm $L^2\text{mol}^{-2}$

Answer: a,b,c,d

Watch Video Solution

360. A gas described by van der Waal's equation:

A. behaves similar to an ideal gas in the limit of large molar volumes

B. behaves similar to an ideal gas in the limit of large pressures

C. is characterised by van der Waals' coefficients that are dependent on the identify of the gas but are independent of the temperature

D. has the pressure that is lower than the pressure exerted by the saem gas behaving ideally.

Answer: a,c,d

Watch Video Solution

361. 0.28 g of a gas occupies 227 mL at STP. The gas could be:

A. N_2

B. CO

C. C_2H_4

D. N_2O_4

Answer: a,b,c,d

Watch Video Solution

362. At constant pressure which of the following does not represent Charle's law?

A. $V = \frac{1}{T}$

B. $V = T$

C. $V \propto \frac{1}{T^2}$

D. $V \propto d$

Answer: acd

Watch Video Solution

363. At of the following does not showexpliently the relationship between Boyle's law and Charles'law?

A. $\frac{P_1}{P_2} = \frac{T_1}{T_2}$

B. PV=K

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

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

Answer: abc

Watch Video Solution

364. Select the correct observartion for a 8.21 litre container, filllled with 2 moles of He at 300K/

A. It has pressure 6 atm.

B. If it is an open rigid container, its pressure increases to 8 atm on heating to 400K

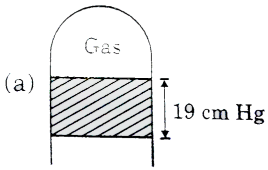
C. IF it is closed non-rigid (like thin skin balloon), its volume increases to 16.42 lit on heating to 600K.

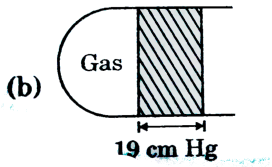
D. When connected with another similar empty container maintained at 150K while maintaining original container at 300 K, pressure reduced to $\frac{2}{3}$ atm.

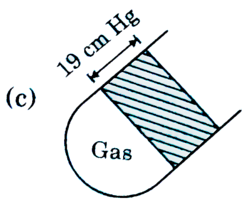
Answer: ac

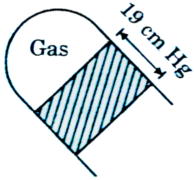
Watch Video Solution

365. In which of the following case(s) pressure of gas is less or equal to atmospheric pressure?

A. 

B. 

C. 

D. 

Answer: abd

Watch Video Solution

366. If the difference in the level of Hg in an open arm manometer (One end open to atmosphere and other end is connected to gas chamber) is 6 mm. then what can be the pressure of gas? (Given: 1 atm=1.01325xx $10^5 N/m^2$)

A. 765mm of Hg

B. 755 mm of Hg

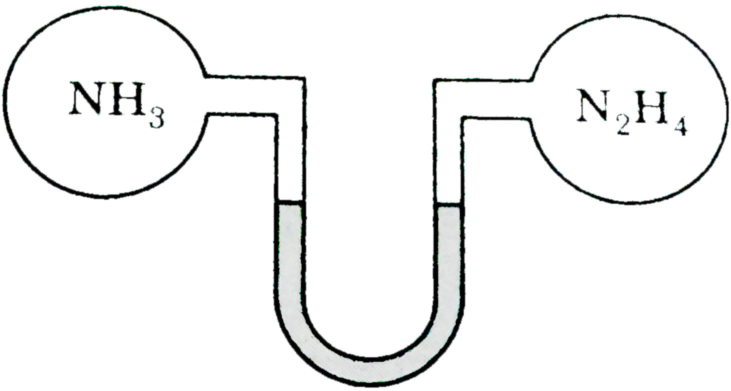
C. 765 torr

D. 700torr

Answer: abc

View Text Solution

367. Figure shows a manometer, one arm is connected with a bulb containing NH_3 and other arm containing N_2H_4 both at initial pressure of 1 atm. Initially both arms of manometer contains liquid at same level, what will be difference in level of arms, when 50% $NH_3(g)$ and 75% $N_2H_4(g)$ dissociates according to the given reaction. Assume temperature remains constant?



$2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$

$N_2H_4(g) \rightarrow N_2(g) + 2H_2(g)$

A. 76 cm if liquid having density 13.6 g/mL is used

B. 38 cm if liquid having density 27.2 g/mL is used

C. 152 cm if liquid having density 6.8g/mL is used

D. 304 cm if liquid having density 3.4g/mL is used

Answer: abcd

Watch Video Solution

368. Select the incorrect statement(s).

A. The compressibility factor (Z) for H_2 and He is given by equation $: Z = 1 + \frac{Pb}{RT}$

B. At critical temperature all real gases behave like and ideal gas.

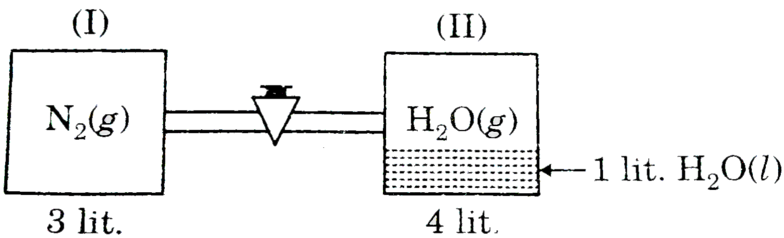
C. The compressibility factor for gas at critical state is $\frac{8}{3}$

D. The rms velocity of ideal gas molecule will be doubled if pressure is made four times by decreasing the volume of container.

Answer: bcd

Watch Video Solution

369. Two containers are connected by a tube of negligible volume container (I) has $N_2(g)$ gas at a pressure 4 atm and temperature T (K) and container (II) has 1 litre $H_2O(l)$ at temp (T) initially. Find correct option(s) after stopcock is removed. (Aq. tension=190torr)



A. Pressure of $N_2 = 2.0$ atm

B. Total pressure=2.25atm

C. Total pressure=1.05 atm

D. Pressure of $H_2O(g)$ is 0.25 atm

Answer: abd

Watch Video Solution

370. According the van der Waal's theory of non-ideal gases, which of the following statement is/are correct?

A. H_2 and He are impossible to liquefy at room temperature

B. For NH_3, Z decreases more rapidly on increasing pressure than the methane in lower pressure region.

C. In the low pressure region Z decrease on increasing pressure H_2 and He are exception to that.

D. In the high pressure region Z increases with increasing pressure, H_2 and He are exception to that.

Answer: abc

Watch Video Solution

371. When an equimolar mixture of two gases A and B $[M_A > M_B]$ is allowed to effuse thrugh a pin hole :

A. B comes out at a faster rate

B. relative rate of effusion of A increaes with time

C. fate of effusion of B will always be greater

D. Initially, with equal molar ratio, rate of effusion of B is greater than rate of effusion of A.

Answer: abd

View Text Solution

372. Which of the following statement(s) is/are correct?

A. In the van der Waal's equation of state $\left(P+\frac{a}{V_m^2}\right)(V_m-b)=RT$ for NH_3 and N_2. The value of 'a' for NH_3 is larger than that of N_2

B. Pressure exerted by real gs is lesser than that exerted by ideal gas under all conditions.

C. At high pressure, pepulsive forces diminates in real gases.

D. If a real gas follows the equation ,$P(V_m - b) = Rt$, it can easily be liquefied.

Answer: ac

Watch Video Solution

373. For one mole of any van der Waal's gas a =0.27 atm-$\text{litre}^2/\text{mol}^2$ and b=1.218 cm^3/mol. Select the correct statement(s).

A. At $600^\circ C$ and 680 atm, it will exist in gaseous form.

B. At 400° C and 6800 atm, it will exist in liquid form.

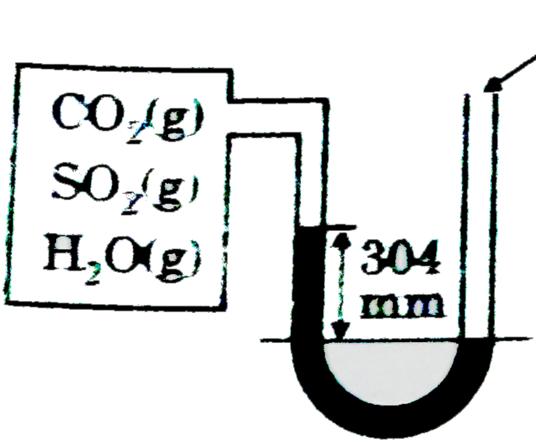
C. At 2700K and low pressure, compression factor $'Z' < 1$.

D. At 2700 K and low pressure, compression factor $'Z' > 1$.

Answer: ab

Watch Video Solution

374. A 82.1 L container connected with manometer contains mixture of CS_2 and H_2S gases and added with required amount of oxygen to form to CO_2, SO_2 and $H_2O(g)$ at $227^\circ C$. Final conditions of manometer is shown.



A. Moles of CS_2 originally present is 0.3

B. Moles of CS_2 originally present is 0.2

C. Moles of H_2S originally present is 0.3

D. Total pressure after combustion is 0.6 atm

Answer: bcd

Watch Video Solution

375. For a real gas, following equation $\left(P+\frac{a}{TV_m^2}\right)(V_m-\beta)=RT$, where $\alpha$and β are positive constants. Select the correct option(s):

A. $T_C=\frac{8\alpha}{27R\beta}$

B. $V_{cm}=3\beta$

C. Second virial coefficient $=\beta-\frac{\alpha}{RT}$

D. Third virial coefficient $=\beta^2$

Answer: bd

View Text Solution

376. Two bulbs of volumes 200 cm^3 and 100 cm^3 are connected by a short tube containing an insulating porous plug that permits equalization of pressure but not of temperature between the bulbs. The system is sealed at $77^\circ C$ when it contains oxygen under a pressure of 1 bar. The small bulb is immersed at $27^{\circ}C$ and the large bulb is placed at $127^{\circ}C$. Neglecting thermal expansion of the bulbs, select the correct options.

A. Final pressure inside the system would be greater than 1 bar

B. Final pressure inside the system would be less than 1 bar

C. Number of moles of O_2 would increase in small container compared to initial

D. Number of moles of O_2 would increase in big container compared to initial

Answer: ac

Watch Video Solution

377. van der Waal's equation of state for real gases may be written as:

$$PV_m = RT\left(1 + \frac{B}{V_m} + \frac{C}{V_m^2} + ...\right)$$

Select the correct statement(s).

A. B' and C are temperature dependent.

B. B' is temperature dependent while 'C' is temperature independent.

C. B' may be positive negative or zero.

D. B' may be positive and 300 K is performing 4×10^9 collisions per sec per O_2 molecule. Select the correct statement(s): Given: $[N_A = 6 \times 10^{23}]$

Answer: bc

Watch Video Solution

378. For $O_2(g)$ at 1 atm and 300K is performing 4×10^9 collisions per sec per O_2 molecule. Select the correct statement

A. $[O_2] = 0.042M$

B. Number density $= 2.3 \times 10^{22}$ molecuels/m^3

C. $u_{\text{avg}} = \sqrt{\dfrac{8 \times 0.0821 \times 300}{32}} cm/s$

D. Mean free path$(\lambda) = \frac{\sqrt{\frac{8 \times 8.314 \times 300}{3.14 \times 0.032}}}{4 \times 10^9} m$

Answer: ad

Watch Video Solution

379. If Cl_2 and PCl_3 can react to form PCl_5 according to following reaction

$Cl_2 + PCl_3 \rightarrow PCl_5$

In tube A,355 gm Cl_2 is taken and in tube B, 1375 gm PCl_3 is taken. When half the mass of gas in tube A is tranferred to B, reaction took place in B. After the reaction is completel, half of the mass of mixture in B is again transferred to A to cause same reaction in container A. (no reversibility) Select the correct option(s).

A. Tube A contains 3.75 moles of PCl_5 and 1.25 moles of PCl_3 finally.

B. Tube A contains 2.5 moles of Cl_2 and 1.25 moles of PCl_5 finally

C. Tube B contains 3.75 moles of PCl_3 and 1.25 moles of PCl_5 finally

D. None of the above

Answer: ac

Watch Video Solution

380. Choose the correct statement(s) among the following.

A. Average molecular speed of gases omcreases wotj decrease in fraction of molecules moving slowly.

B. Rate of effusion of gases increases with increase in collision frequency at constant volume.

C. Rate of effusion is inversely proportional to molecular weight of gas.

D. Mean free path does change with change in temperature at constant pressure.

Answer: ab

Watch Video Solution

381. Choose the correct alternative (more than one may be correct) (B.M.C.=Bimolecular collision)(at constantV) (n-is constant throughout).

A. λ is constant.

B. BMC made by 1 molecule per second is directly proportional to $\sqrt{P}$.

C. BMC for all the molecules per unit volume is directly proportional to $T^{3/2}$

D. None of the above

Answer: ab

View Text Solution

382. Select the correct option.

A. Gas is more compressible, if repulsive forces don=minate over attractive forces between molecules.

B. At extemely low pressure and high temperature gases behave ideally.

C. At Boyle's temperature gases behave ideally in low pressure region.

D. If a gas is kept at $T > T_C$. It can never be liquefied.

Answer: bcd

Watch Video Solution

383. A closed vessel at temperature T contains a mixture of two diatomic gases A and B. Atomic mass of A is 16 times that of B and mass of gas A contained in the vessel is 2 times that of B. which of the following statements are correct?

A. Average kinetic energy per molecule of A is equal to that of B.

B. Root mean square velocity of B four times that of A.

C. Pressure exerted by B is eight times of that of A.

D. Number of molecules of B, in cylinder, is eight times that A,.

Answer: abcd

Watch Video Solution

384. Select the correct option(s) for an ideal gas.

A. Most probable speed increases with increase in temperature

B. Fraction of particles moving with most probable speed increases with increase in temperature

C. Fraction of particles moving with most probable speed are more for Cl_2 than H_2 under similar conditions of T,P andV

D. Most probable speed is more for Cl_2 than H_2 at same temperature.

Answer: ac

Watch Video Solution

385. According to kinetic theory of gases, for a diatomic molecule wich is (are) not correct?

A. The pressure exerted by the gas is directly proportional to the mean speed of the molecule

B. The pressure exerted by the gas is directly proportional to the root mean square speed of the molecule.

C. The root mean square speed of the molecule is inversely proportional to the temperature.

D. The mean transitional kinetic energy of the molecule is proportional to the absolute temperature.

Answer: abc

View Text Solution

386. Choose the incorrect statement.

A. Rate of effusion of gas is inversely proportional to the molecular weight of gas.

B. Mean free path of gases decreases with increase in temperature at constant volume.

C. Partial pressure of gas does not change on addition of another gas in the same container at constant volume and temperature.

D. Compressibility of real gases are always more than ideal gases.

Answer: abd

Watch Video Solution

387. Which of the following are correct for real gases?

A. Value of 'a' is measure of magnitude of intermolecular attractive forces within the gas and is independent of temperature and pressure.

B. Repulsive interactions between molecules are short range interadction and are significant when molecules are almost in contact.

C. Boyle point of a real gas depends upon nature of gas.

D. Real gases show ideal behavior whn conditions of temperature and pressure are such that the intermolecular forces are practically negligible.

Answer: abcd

Watch Video Solution

388. 5 moles gas are introduced in 1 litre container at $47^{\circ}C$. Select the correct option(s).

[R=0.08litre-atm/mol-K]

A. Pressure would be 128 atm if it behaves ideally

B. pressure would be 28 atm if it follows van der Waals' equation, a=4 atm-$\mathrm{litre}^2/\mathrm{mol}^2$ and b=0

C. Pressure would be 33.33 atm if it follows van der Waals' equation , a=4 atm-$\mathrm{litre}^2/\mathrm{mol}^2$ and b=0.04L/mole

D. Pressure would be 160 atm if it follows van der Waal's equation, a=0atm$-\mathrm{litre}^2/\mathrm{mol}^2$ and b=0.04L/mole

Answer: abd

View Text Solution

389. 1 mol N_2 and 3 mol H_2 are introduced in 8.21 litre container initially at $27^\circ C$ where no chemical reaction takes place. Select the correct statement(s).

A. Partial pressure of N_2 is 12 atm

B. Partial pressure of N_2 is 3 atm

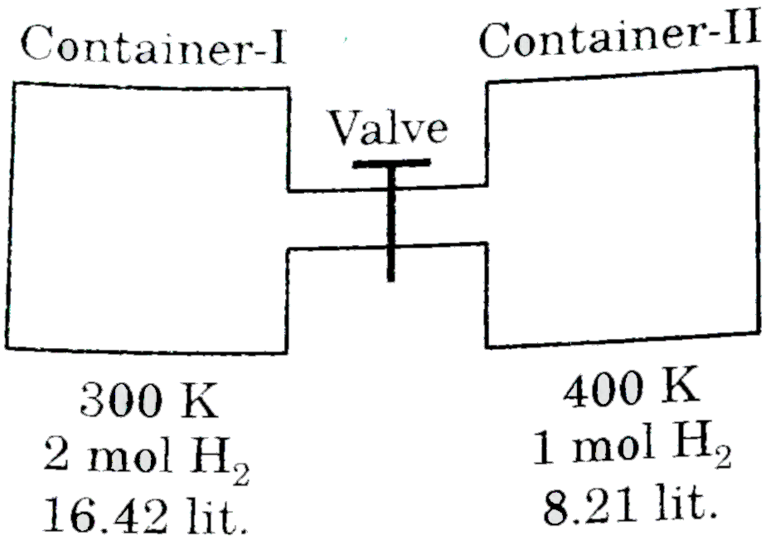
C. Total pressure is 9 atm.

D. If temperature is increased to 600K and NH_3 formation takes place with 100% yield then total pressure developed is 12 atm.

Answer: bd

Watch Video Solution

390. Select the correct option(s)



A. Pressure in container-I is 3 atm before opening the valve.

B. Pressure after opening the valve is 3.57 atm.

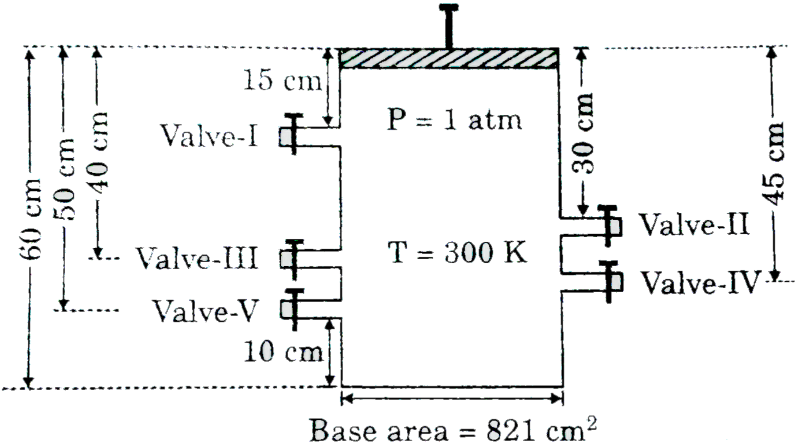
C. Moles in each compartment are same after opening the valve.

D. Pressure in each compartment are same after opening the valve.

Answer: ad

Watch Video Solution

391. A container fitted with frictionless massless piston consists of five valves -I,II,III,IVandV. These valves open automatically if pressure exceed over 1.5,2.2,2.5,4.4 and 4.8 atm respectively Under diagram) system is in sate of equilibrium. Piston is now presisted in downward direction very slowly. [Note: Consider the diameter of valve tube negligible and temperature remains constant.]



Select the correct option(s)

A. Valve-II will be opened first.

B. As the piston crosses the valve which will be opened first, the remaining number of moles in container are $\frac{5}{3}$.

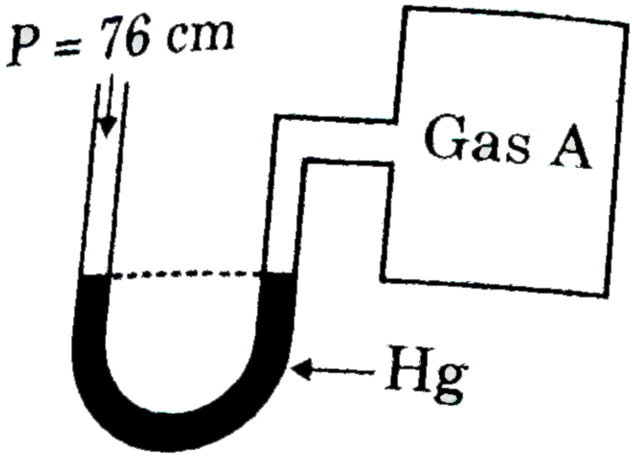
C. Valve-V will be second valve which open.

D. Number of moles will zero as piston crosses Valve-V.

Answer: bc

Watch Video Solution

392. An open ended mercury mnometer is used to measure the pressure exerted by a trapped gas as shown in the figure. Initially manometer shows no difference in mercury level in both columns as shown in diagram.



After sparking A dissociates according to following reaction:

$2A(g) \rightarrow 3B(g) + 2C(g)$ ltbr. If pressure of Gas A decreases to 0.8 atm. Then:

(Assume temperature to be constant at 300K)

A. total pressure increased by 1.3 atm

B. total pressure increased by 0.3 atm

C. total pressure increased by 22.3 cm of Hg

D. difference in mercuty level is 228mm

Answer: bd

Watch Video Solution

393. According to kinetic theory of gases:

A. collisions are aways elastic

B. heavier molecuels transfer more momentum to the wall of the container.

C. only a small number of molecules have very high velocity

D. between collisons, the molecules move to straight lines with constant velocities

Answer: acd

Watch Video Solution

394. Choose the correct statement(s) for real gases.

A. Real gases do not follow ideal gas equation perfectly under all conditions.

B. At very high pressure, the measured volumes is more than calculated volume.

C. Al low pressure measured and calculated volumes approach each other.

D. Real gas can never be liquified.

Answer: abc

Watch Video Solution

395. Which of the assumptions/postulates of kinetics theory does not hold good for a real gas?

A. Tehre is non force of attraction betwwen the molecules of a gas.

B. Colume of the molecuels of a gas is negligibly small in comparison to the space occupied by the gas.

C. Particles of a gas are always in constant and random motion/

D. Collisions of gas molecules are perfectly elastic.

Answer: ab

Watch Video Solution

396. If distance between 2 molecuels is r then lim $\frac{1}{r^x}$ will result in which of the following equations to be true/applicable?

A. Z=1

B. $Z < 1$

C. $Z > 1$

D. $PV_m = RT$

Answer: ad

Watch Video Solution

397. Choose the correct statement(s) regarding Boyle's point.

A. It depends on nature of gas.

B. Above this point, real gas show positve deviations from ideality and $Z < 1.$

C. Below Boyle's point, real gas first show decrease in Z value with increasing pressure to reach a minimum value.

D. On further increase in pressure, the value of Z increases continously.

Answer: acd

Watch Video Solution

398. According to ideal gas equation $\frac{PV}{nT}$ for ga will always be constant and the constant is same for all gaes. The constant representd as R is termed as universal gas constant has a value equal to 0.0821 atm-lit/mol-K. Another constant Boltzmann constant is defined as $\frac{R}{N_A}$=k where N_A representes Avogadro's number. The value of $\frac{PV}{kT}$ will give:

A. number of moles of gas

B. density of gas

C. number of molecules of gas

D. mass of gas

Answer: c

Watch Video Solution

399. According to ideal gas equation $\frac{PV}{nT}$ for ga will always be constant and the constant is same for all gaes. The constant representd as R is termed as universal gas constant has a value equal to 0.0821 atm-lit/mol-

K. Another constant Boltzmann constant is defined as $\frac{R}{N_A}$=k where N_A representes Avogadro's number.

The value of R in terms of bar -mL/mole-Kelvin will be:

A. 0.0821

B. 82.1

C. 83.18

D. $\frac{82.1}{1.01325}$

Answer: c

Watch Video Solution

400. According to ideal gas equation $\frac{PV}{nT}$ for ga will always be constant and the constant is same for all gaes. The constant representd as R is termed as universal gas constant has a value equal to 0.0821 atm-lit/mol-K. Another constant Boltzmann constant is defined as $\frac{R}{N_A}$=k where N_A representes Avogadro's number.

A container of volume 40 litres consists of some gas at a pressure of 2 atm and temperature of 300 K it is heated to 400 K such that half of the gas escapes and volume changes to 60 litres The new pressure of the gas at final condition will be:

A. 2 atm

B. 1 atm

C. $\frac{8}{9}$ atm

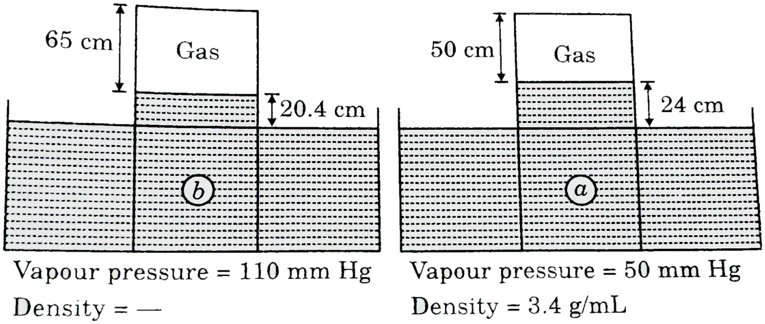
D. $\frac{9}{8}$ atm

Answer: c

Watch Video Solution

401. If same amount of gas is trapped over liqquid (a) and liquid (b) in following container4s. Assuming temperature and cross-sectional area of container are same.

$P_{\text{atm}} = 760mmHg, d_{Hg} = 13.6g/mL$



If same amount of gas is trapped over liquid (a) and liquid (b) in following containers. Assuming temperature and cross-sectional area of container are same. $P_{atm} = 760 mmHg, d_{Hg} = 13.6 g/mL$

Find the pressure (in cm Hg) of gas over liquid (a)

A. 76 cm

B. 11 cm

C. 50 cm

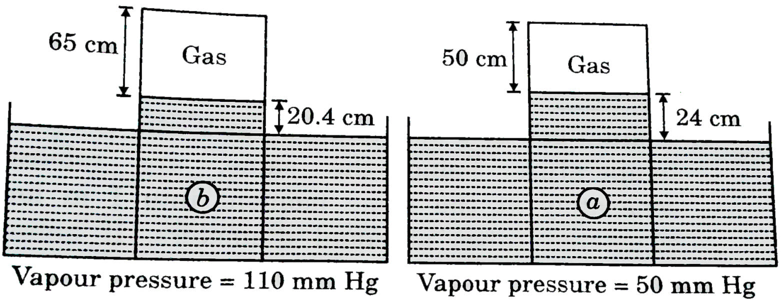
D. 65 cm

Answer: d

Watch Video Solution

402. If same amount of gas is trapped over liquid (a) and liquid (b) in following containers. Assuming temperature and cross-sectional area of container are same. $P_{atm} = 760 mmHg, d_{Hg} = 13.6 g/mL$

Find the pressure (in cm Hg) of gas over the liquid (b).



A. 76 cm

B. 11 cm

C. 50 cm

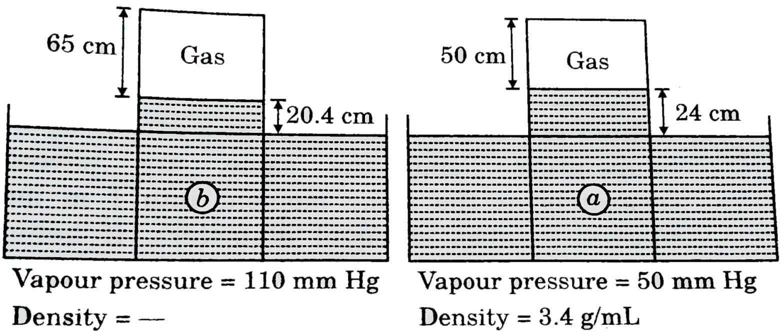
D. 65 cm

Answer: c

Watch Video Solution

403. If same amount of gas is trapped over liquid (a) and liquid (b) in following containers. Assuming temperature and cross-sectional area of container are same. $P_{atm} = 760mmHg, d_{Hg} = 13.6g/mL$

The density of liquid (b) will be:



A. $5g/$

B. $10g/$

C. $15g/$

D. $20g/$

Answer: b

Watch Video Solution

404. Equal masses (W gram each) of three non- reacting gases X,Y and Z were mixed in sealed rigid container and total pressure at a given temperature T was found to be 'P' atmosphere Now '2W' gram of X is further added to same container and temperature was raised to '2T' At '2T' temperature new pressure was found to be '4P' atmosphere Now '3W' gram of Y was added further and temperature was raised to '4T' New pressure was found to be '12P'

Based on above information lightest and heaviest gases are respectively:

A. Y,Z

B. X,Z

C. X, Y

D. Z, X

Answer: b

Watch Video Solution

405. Equal masses (W gram each) of three non- reacting gases X,Y and Z were mixed in sealed rigid container and total pressure at a given temperature T was found to be 'P' atmosphere Now '2W' gram of X is further added to same container and temperature was raised to '2T' At '2T' temperature new pressure was found to be '4P' atmosphere Now '3W' gram of Y was added further and temperature was raised to '4T' New pressure was found to be '12P'

Partial pressure of X and Y after adding '2W' gram of X in container are respectively

A. $P, \frac{P}{3}$

B. $2P, \frac{P}{6}$

C. $2P, \frac{P}{3}$

D. $3P, \frac{2P}{3}$

Answer: d

Watch Video Solution

406. Equal masses (W gram each) of three non- reacting gases X,Y and Z were mixed in sealed rigid container and total pressure at a given temperature T was found to be 'P' atmosphere Now '2W' gram of X is further added to same container and temperature was raised to '2T' At '2T' temperature new pressure was found to be '4P' atmosphere Now '3W' gram of Y was added further and temperature was raised to '4T' New pressure was found to be '12P'

In final conditions partial pressure of 'Z' is:

A. $\frac{P}{3}$

B. $\frac{3P}{4}$

C. $\frac{2P}{3}$

D. $\frac{P}{6}$

Answer: c

Watch Video Solution

407. The constant motion and high velocities of gas particles lead to some important practical consequences One such consequence is that is mixing rapidly when they come in contact. The mixing of different gases by random molecular motion and with frequent collisions is called diffusion.A similar process in which gas molecules escape through a tiny hole into vaccum is called effusion.

Helium gas at 1 atm and SO_2 at 2 atm pressure temperature being the same are released seperately at the same moment into 1 m long evacuated tubes of equal diameters If helium reaches the other end of the tube in t sec what distance SO_2 would traverse in the same time interval in the other tube?

A. 25 cm

B. 50 cm

C. 60 cm

D. 75 cm

Answer: b

View Text Solution

408. The constant motion and high velocities of gas particles lead to some important practical consequences One such consequence is that is mixing rapidly when they come in contact. The mixing of different gases by random molecular motion and with frequent collisions is called diffusion.A similar process in which gas molecules escape through a tiny hole into vaccum is called effusion.

4 g of H_2 effused through a pinhole in 10 sec at constant temperature and pressure The amount of oxygen effused in the same time interval and at the same conditions of temperature and pressure would be

A. 4 g

B. 8 g

C. 16 g

D. 32 g

Answer: c

View Text Solution

View Text Solution

409. The constant motion and high velocities of gas particles lead to some important practical consequences One such consequence is that is mixing rapidly when they come in contact. The mixing of different gases by random molecular motion and with frequent collisions is called diffusion.A similar process in which gas molecules escape through a tiny hole into vaccum is called effusion.

For 10 min each at 27° C from two identical bulbs helium and an unknown gas X at equal pressure are leaked into a common vessel of 3L capacity. The resulting pressure is 4.1 atm and the mixture contains 0.4 mol of helium The molar mass of gas X is

A. 16

B. 32

C. 64

D. none of these

Answer: c

Watch Video Solution

410. For a non-ideal gas, the compressibility factor (Z) is defined as

$Z = \frac{PV_m}{RT}$, V_m= molar volume

Compressibility of an unknown gas at 600 K and 1.0 atm was found to be 1.2 Also, this gas was found to effuse 1.58 times slower than the pure methane gas under identical conditions Take $R = 0.0821$ L-atm-$mol^{-1}k^{-1}$

Density of the gas in the above mentioned experimental condition is:

A. $0.98gL^{-1}$

B. $0.68gL^{-1}$

C. $1.02gL^{-1}$

D. $1.47gL^{-1}$

Answer: b

View Text Solution

411. For a non-ideal gas, the compressibility factor (Z) is defined as

$Z = \frac{PV_m}{RT}$, V_m= molar volume

Compressibility of an unknown gas at 600 K and 1.0 atm was found to be 1.2 Also, this gas was found to effuse 1.58 times slower than the pure methane gas under identical conditions Take $R = 0.0821$ L-atm-$mol^{-1}k^{-1}$

Molar volume of the gas in the given experimental condition is:

A. 41.0 L

B. 39.4 L

C. 59.1 L

D. 27.3 L

Answer: c

View Text Solution

412. Ideal gas is defined as a gas whose molecules move independent of each other without any net force between them. Also molecules//atoms of ideal gas are assumed to be like point masses with negligible size. But real gas molecules have net force between them and have a finite size which may or may not be negligible.

Two samples of O_2 (g) having equal moles at 1 atm and 0° C are heated at constant volume to 27° C Assuming both samples are ideal at 0° C but at 27° C one is ideal and another is real which of the following is correct?

A. Final pressure is more for real gas

B. Final pressure is more for ideal gas

C. Final pressure is equal in both cases

D. Cannot predict

Answer: b

Watch Video Solution

413. Ideal gas is defined as a gas whose molecules move independent of each other without any net force between them. Also molecules//atoms of ideal gas are assumed to be like point masses with negligible size. But real gas molecules have net force between them and have a finite size which may or may not be negligible.

In the above given experiment if helium gas was used in both samples which sample would have greater final pressure?

A. Ideal gas

B. Real gas

C. Equal in both samples

D. Cannot predict

Answer: b

Watch Video Solution

414. Two bulbs 'X' and 'Y' of equal volumes are connected through a stop cock. Each bulb contained 9.6 g of dioxygen gas at 0.4 atm pressure and 300 K The first bulb 'X' is then heated to 500K keeping bulb 'Y' at 300 K. Final pressure in bulb 'X' is:

A. 0.2 atm

B. 0.3 atm

C. 0.5 atm

D. 0.75 atm

Answer: c

Watch Video Solution

415. Two bulbs 'X' and 'Y' of equal volumes are connected through a stop cock. Each bulb contained 9.6 g of dioxygen gas at 0.4 atm pressure and 300 K The first bulb 'X' is then heated to 500K keeping bulb 'Y' at 300 K. Final number of moles of dioxygen in vessel 'Y' would be:

A. 0.225

B. 0.275

C. 0.375

D. 0.425

Answer: c

Watch Video Solution

416. The process by which a gas passes through a small hole into vacuum is called effusion. The rate of change of pressure(p) of a gas at constant temperature due to effusion of gas from a vessel of constant volume can be related to rate of change of number of molecules by the expression:

$$\frac{dp}{dt} = \frac{kT}{V}\left(\frac{dN}{dt}\right)$$

where rate of change of number of molecules

$$\Rightarrow -\left(\frac{dN}{dt}\right) = \frac{pA_0}{(2\pi mkT)^{1/2}}$$

where k=Boltzmann constant

N_A = Avogadro's number

T= Temperature (in K)

V= volume of vessel

N=Number of molecules

A_0 = Area of aperture

m=Mass of single molecule

$$\gamma = \frac{V}{A_0}\sqrt{\frac{2\pi m}{kT}}$$

If 2 g of SO_2 effuses from given container in 10 sec then, mass of He effusing out in 30 seconds under identical conditions will be:

A. 6 g

B. 3 g

C. 1.5 g

D. 0.75 g

Answer: c

Watch Video Solution

417. The process by which a gas passes through a small hole into vacuum is called effusion. The rate of change of pressure(p) of a gas at constant temperature due to effusion of gas from a vessel of constant volume can be related to rate of change of number of molecules by the expression:

$$\frac{dp}{dt} = \frac{kT}{V}\left(\frac{dN}{dt}\right)$$

where rate of change of number of molecules

$$\Rightarrow -\left(\frac{dN}{dt}\right) = \frac{pA_0}{(2\pi mkT)^{1/2}}$$

where k=Boltzmann constant

N_A = Avogadro's number

T= Temperature (in K)

V= volume of vessel

N=Number of molecules

A_0 = Area of aperture

m=Mass of single molecule

$$\gamma = \frac{V}{A_0}\sqrt{\frac{2\pi m}{kT}}$$

In 1 m long tube at one end He is introduced while from other end SO_2 is introduced under identical conditions Gas will first meet from He and at a distance:

A. $\frac{1}{2}$ m

B. $\frac{1}{5}$ m

C. $\frac{3}{5}$ m

D. $\frac{4}{5}$ m

Answer: d

Watch Video Solution

418. A container is divided into two compartments. One compartment contains 2 moles of N_2 gas at 1 atm and 300 K and other compartment contains H_2 gas at the same temperature and pressure. Volume of H_2 compartment is four times the volume of N_2 compartment [Assuming no reaction under these conditions]

Calculate the final total pressure if partition between two compartments is removed.

A. 2 atm

B. 3 atm

C. 1 atm

D. 1.5 atm

Answer: c

Watch Video Solution

419. A container is divided into two compartments. One compartment contains 2 moles of N_2 gas at 1 atm and 300 K and other compartment contains H_2 gas at the same temperature and pressure. Volume of H_2 compartment is four times the volume of N_2 compartment [Assuming no reaction under these conditions]

If the container containing N_2 and H_2 are further heated to 1000 K, forming NH_3 with 100% yeild calculate the final total pressure.

A. 2.22 atm

B. 3 atm

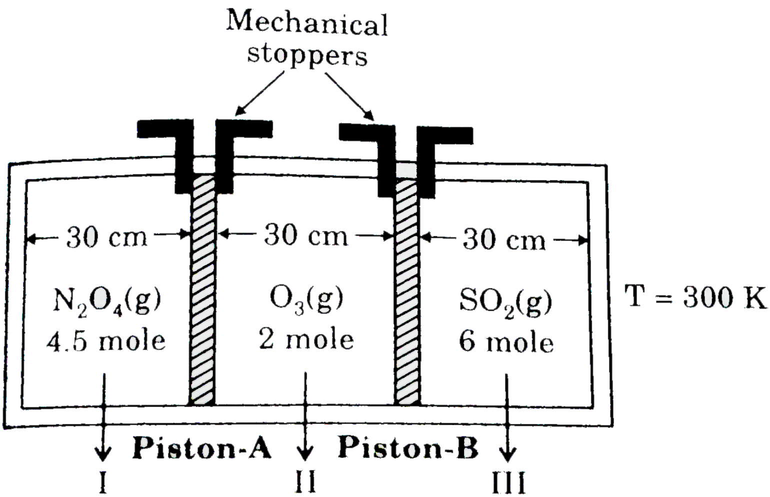
C. 2 atm

D. 3.33 atm

Answer: c

Watch Video Solution

420. The figure shows initial conditions of a uniform cylinder with frictionless pistons A and B held in shown position by mechanical stoppers.



If the mechanical stoppers holding piston A and B as shown in figure are removed and in the mean time N_2O_4 and O_3 gases separately undergo following reaction completely [Assume that temperature remains constant]

$N_2O_4 \rightarrow 2NO_2$

$2O_3 \rightarrow 3O_2$

Which statement is incorrect after attaining final equilibrium state?

A. Position of piston A is 45 cm from left end

B. Position of piston B is 60 cm from left end

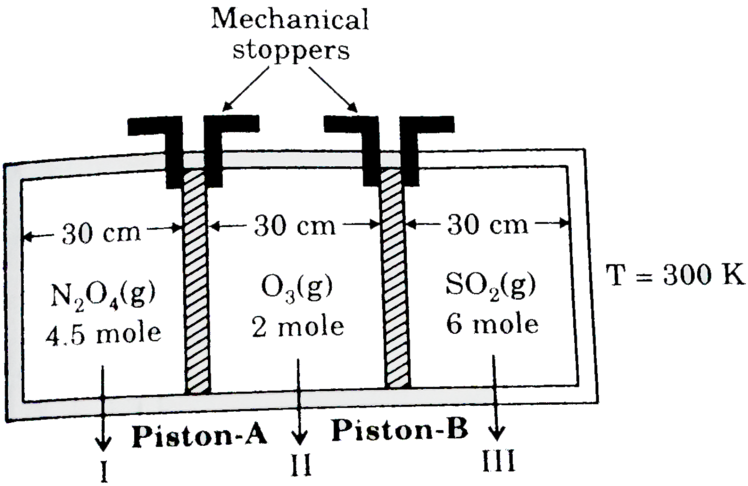
C. Total moles of gases in all compartments is 18.

D. Position 'B' final and initial position are different

Answer: d

Watch Video Solution

421. The figure shows initial conditions of a uniform cylinder with frictionless pistons A and B held in shown position by mechanical stoppers.



If the mechanical stoppers holding piston A and B as shown in figure are removed and in the mean time N_2O_4 and O_3 gases separately undergo following reaction completely [Assume that temperature remains constant]

$N_2O_4 \rightarrow 2NO_2$

$2O_3 \rightarrow 3O_2$

Which statement is correct after all the pistons have attained their final positions (assume σ to be same for all gases)?

A. Z_{11} will be highest for molecules of gas in compartment 1

B. Mean free path will be longest for molecules of gas in compartments2

C. Z_{11} will be same for all gases

D. Mean free path will be same for molecules of gas in all compartments

Answer: d

Watch Video Solution

422. A gaseous mixture comprising of equal moles of $H_2/O_2/M$ (M mass=128) was subjected to series of effusion steps. What will be the number effusion steps required so as to change the composition to:

One in which lightest: Heaviest gas is $4096:1$ What will be the composition of this mixture (w.r.t all the gases)?

A. 4,4096:16:1

B. $6, 4096 \times 64:64:1$

C. 4,2048:8:1

D. $5, 4096:16:1$

Answer: a

Watch Video Solution

423. A gaseous mixture comprising of equal moles of $H_2/O_2/M$ (M mass=128) was subjected to series of effusion steps. What will be the number effusion steps required so as to change the composition to:

One in which $H_2:O_2$ is 4096:1. What will be the composition of this mixture (w.r.t. all the gases)?

A. 4,4096:16:1

B. $6, 4096 \times 64:64:1$

C. 4,2048:8:1

D. 5,4096:16:1

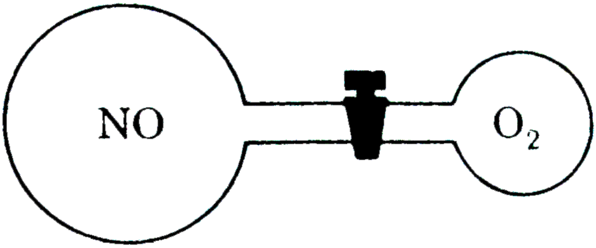
Answer: b

Watch Video Solution

424. Nitric oxide (NO) reacts with molecular oxygen as follows:

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

Initially NO and O_2 are separated as shown below. When the valve is opened the reaction quickly goes to completion Assume that the temperature remains constant at 27° C $[R = 0.08 atmlit / mol / K]$



4L at 0.5 atm and 300 K

2L at 1 atm and 300 K

Number of moles of NO_2 after reaction in 4 L container is:

A. $\frac{1}{24}$

B. $\frac{1}{18}$

C. $\frac{1}{22}$

D. $\frac{1}{12}$

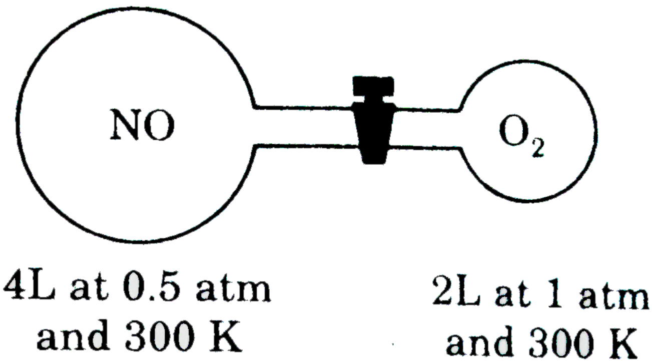
Answer: b

Watch Video Solution

425. Nitric oxide (NO) reacts with molecular oxygen as follows:

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

Initially NO and O_2 are separated as shown below. When the valve is opened the reaction quickly goes to completion Assume that the temperature remains constant at 27° C $[R = 0.08 atmlit/mol/K]$



The pressure of O_2 in 2L container after reaction is:

A. $\frac{1}{6}$

B. 0

C. $\frac{1}{3}$

D. none of these

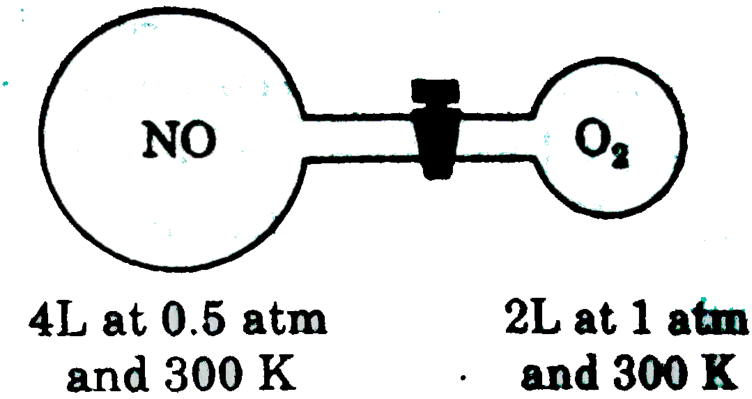
Answer: a

Watch Video Solution

426. Nitric oxide (NO) reacts with molecular oxygen as follows:

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

Initially NO and O_2 are separated as shown below. When the valve is opened the reaction quickly goes to completion Assume that the temperature remains constant at 27° C $[R = 0.08 atmlit / mol / K]$



The ratio of partial pressure of NO_2 in 4L container to 2L container is:

A. 1

B. 2

C. 3

D. 0.5

Answer: a

Watch Video Solution

427. Under a given condition, it is found that two separate gases effuse out of two separate containers in such a way that they follow the equation

$$\frac{dN}{dt} = -K_1N \text{ and } \frac{dN}{dt} = -K_2NK_1 = 6.93 \times 10^{-2}\sec^{-1}. K_2 = 6.93$$

where N is no of molecule remaining in the container.

Which one of the following may represent fraction of number of molecules present after the given interval for gas-I?

A. $t = 0t = 100\sec t = 200\sec$

1 $\frac{1}{2}\frac{1}{8}$

B. $t = 0t = 100 \sec t = 200 \sec$

$1 \frac{1}{8} \frac{1}{16}$

C. $t = 0t = 100 \sec t = 200 \sec$

$1 \frac{1}{2} \frac{1}{4}$

D. $t = 0t = 100 \sec t = 200 \sec$

$1 \frac{1}{4} \frac{1}{16}$

Answer: c

Watch Video Solution

428. Under a given condition, it is found that two separate gases effuse out of two separate containers in such a way that they follow the equation

$$\frac{dN}{dt} = -K_1 N \text{ and } \frac{dN}{dt} = -K_2 N K_1 = 6.93 \times 10^{-2} \sec^{-1}. K_2 = 6.93$$

where N is no of molecule remaining in the container.

Identify the correct option regarding sequence of (True) and (False) statements

(i) The time required for moles of gas I to get reduced to half of original and that of gas II to be reduced to half of original is independent of initial moles of gas I and gas II.

(ii) THe rate at which initially molecules will come out in gas I as comapred to gas II will be greater in gas II if initial number of molecules are same.

(iii) The time required for moles to get reduced from 1 to 0.8 in gas I and 2 to 1.6 in gas II will be same.

(iv) for the two gases, moles remaining in the container after some ubterval should be in Geometrical Progression.

A. TFFT

B. TFTT

C. FTFT

D. TTFF

Answer: a

Watch Video Solution

429. For the data

Gaseous Substance	T_C/K	P_C/bar	V_C/dm^{3}mol
A	33.2	13	0.065
B	5.3	2.3	0.058
C	126	34	0.090
D	154	50	0.074
E	304	74	0.096
F	647	221	0.045
G	406	113	0.072

IF temperature is decreased from a very high value which will start liquefying at 3rd position?

A. G

B. F

C. A

D. E

Answer: d

Watch Video Solution

430. For the data

For which gas is Z expected to be >1 always?

Gaseous Substance	T_C/K	P_C/bar	V_C/dm^{3}mol^{-1}
A	33.2	13	0.065
B	5.3	2.3	0.058
C	126	34	0.090
D	154	50	0.074
E	304	74	0.096
F	647	221	0.045
G	406	113	0.072

A. A

B. B

C. F

D. G

Answer: ab

Watch Video Solution

431. For the data

If adsorption of gases is done on a charcoal surface which gas will start adsorbing after gas D?

Gaseous Substance	T_C/K	P_C/bar	V_C/$dm^3 mol^{-1}$
A	33.2	13	0.065
B	5.3	2.3	0.058
C	126	34	0.090
D	154	50	0.074
E	304	74	0.096
F	647	221	0.045
G	406	113	0.072

A. C

B. E

C. F

D. G

Answer: a

Watch Video Solution

432. A barometer is an instrument that is used for the measurement of pressure The construction of the barometer is as follows:

A thin narrow calibrated capillary tube is filled to the brim with a liquid such as mercury and is inverted into a through filled with the same fluid Now depending on the external atmospheric pressure the level of the inside capillary comes to rest, then the net forces on the column should be balanced Applying force balance we get $P_{atm} \times A = m \times g$

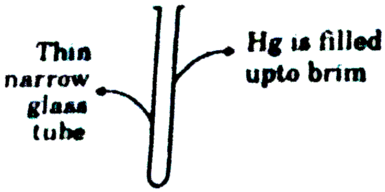
(A is the cross-sectional area of the capillary tube) if ρ is the density of the fluid, then $m = \rho \times g \times h$

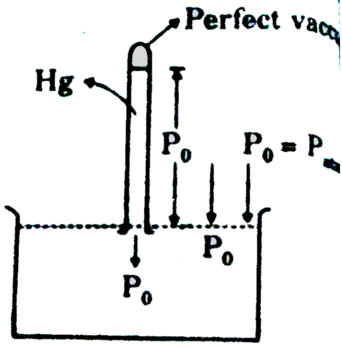
(h is the height to which mercury has risen in the capillary)

Hence $P_{atm} \times A = (\rho \times g \times h) \times A \text{ or } P_{atm} = \rho gh$

Faulty Barometer:

An ideal barometer will show a correct reading only if the space above the mercury column is vacuum but in case if some gas column is trapped in the space above the mercury column then the barometer is classified as a faulty barometer. The reading of such a barometer will be less than the true pressure





For such a faulty barometer

$P_0 A = mg + P_{gas} A$

$P_0 = \rho hg + P_{gas}$

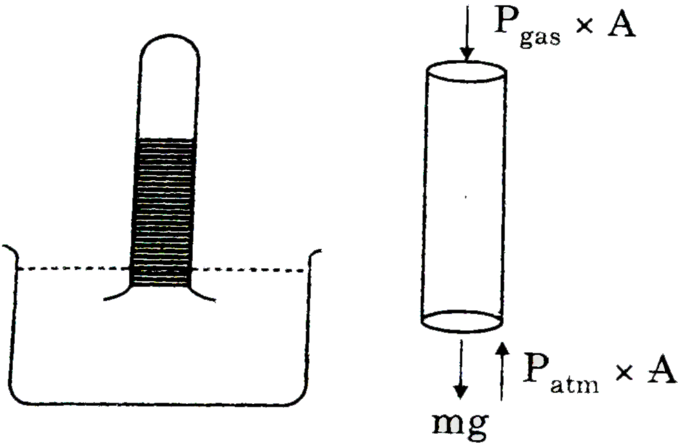
or $\rho gh = P_0 - P_{gas}$

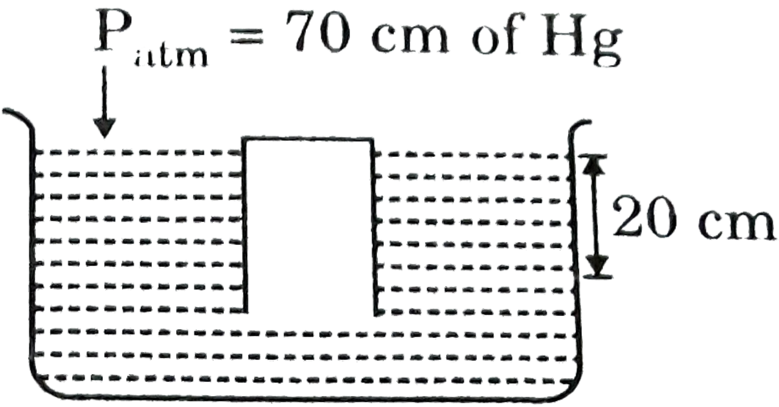
A tube closed at one end is dipped in mercury as shown in figure such that the closed surface coincides with the mercury level in the container By how much length of the tube should be extended such that the level of Hg in the tube is 5 cm below the mercury level inside the container? (Assume temperature remains constant)

at equilibrium

$P_0A = mg$

$= \pi\rho(Ah)g$





A. 18 cm

B. 19 cm

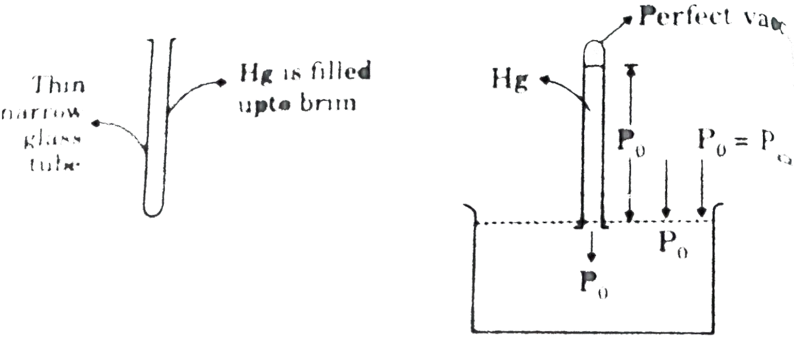
C. 24 cm

D. 30 cm

Answer: b

Watch Video Solution

433. A barometer is an instrument that is used for the measurement of pressure The construction of the barometer is as follows:



A thin narrow calibrated capillary tube is filled to the brim with a liquid such as mercury and is inverted into a through filled with the same fluid Now depending on the external atmospheric pressure the level of the inside capillary comes to rest, then the net forces on the column should be balanced Applying force balance we get $P_{atm} \times A = m \times g$

(A is the cross-sectional area of the capillary tube) if ρ is the density of the fluid, then $m = \rho \times g \times h$

(h is the height to which mercury has risen in the capillary)

Hence $P_{atm} \times A = (\rho \times g \times h) \times A$ or $P_{atm} = \rho g h$

Faulty Barometer:

An ideal barometer will show a correct reading only if the space above the mercury column is vacuum but in case if some gas column is trapped in the space above the mercury column then the barometer is classified as a faulty barometer. The reading of such a barometer will be less than the true pressure

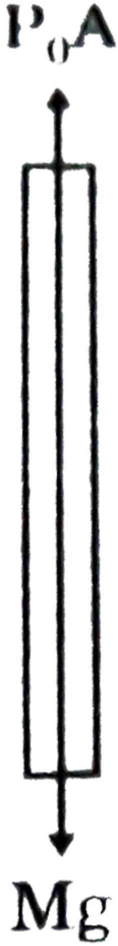
For such a faulty barometer

$P_0 A = mg + P_{gas} A$

$P_0 = \rho hg + P_{gas}$

or $\rho gh = P_0 - P_{gas}$

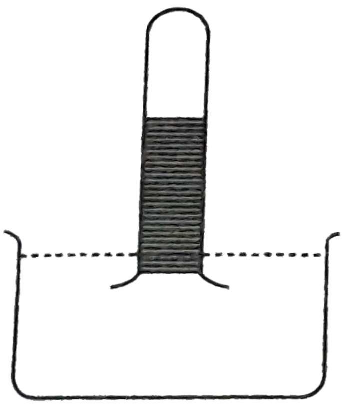
If the tube shown below is placed vertically with the open and upward then the length of the air column will be (Assume temperature remains constant)

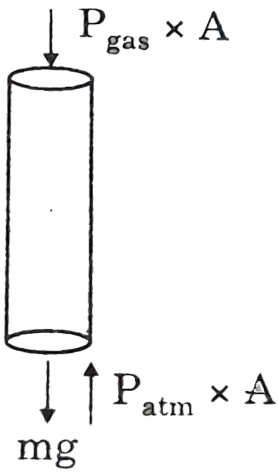


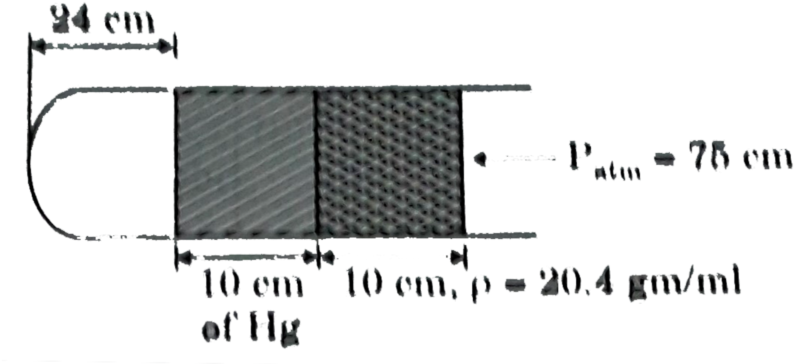
at equilibrium

$P_0A = mg$

$= \pi\rho(Ah)g$







A. 20 cm

B. 36 cm

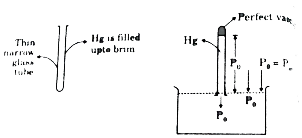
C. 18 cm

D. 15 cm

Answer: c

Watch Video Solution

434. A barometer is an instrument that is used for the measurement of pressure The construction of the barometer is as follows:



A thin narrow calibrated capillary tube is filled to the brim with a liquid such as mercury and is inverted into a through filled with the same fluid Now depending on the external atmospheric pressure the level of the inside capillary comes to rest, then the net forces on the column should be balanced Applying force balance we get $P_{atm} \times A = m \times g$

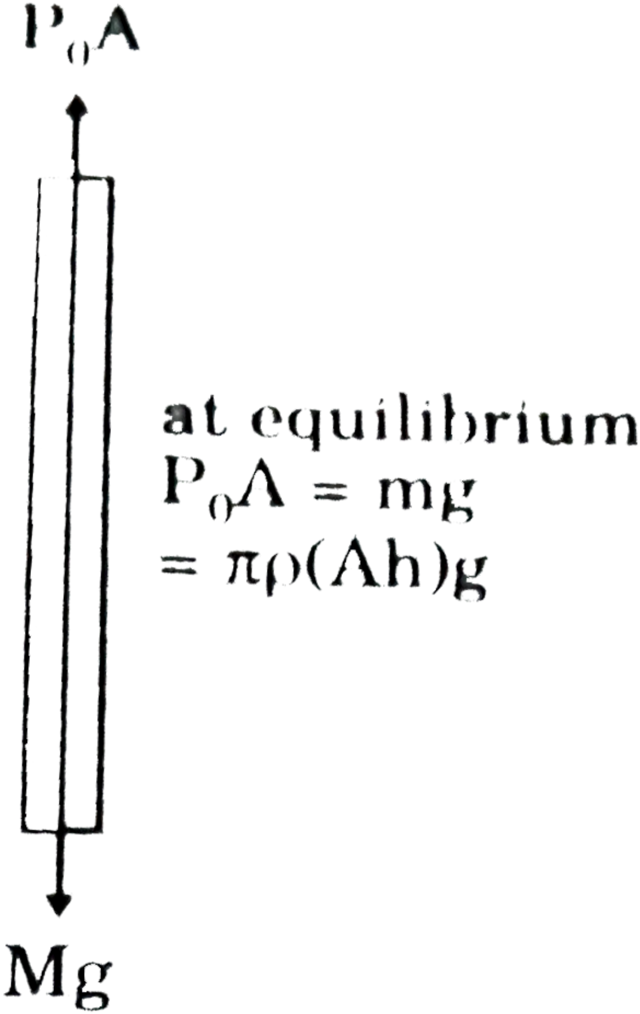
(A is the cross-sectional area of the capillary tube) if ρ is the density of the fluid, then $m = \rho \times g \times h$

(h is the height to which mercury has risen in the capillary)

Hence $P_{atm} \times A = (\rho \times g \times h) \times A \text{ or } P_{atm} = \rho gh$

Faulty Barometer:

An ideal barometer will show a correct reading only if the space above the mercury column is vacuum but in case if some gas column is trapped in the space above the mercury column then the barometer is classified as a faulty barometer. The reading of such a barometer will be less than the true pressure



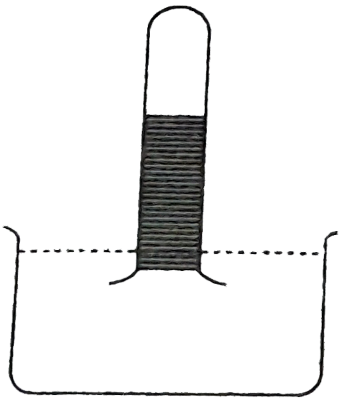
For such a faulty barometer

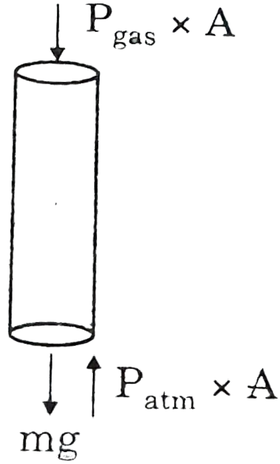
$$P_0A = mg + P_{gas}A$$

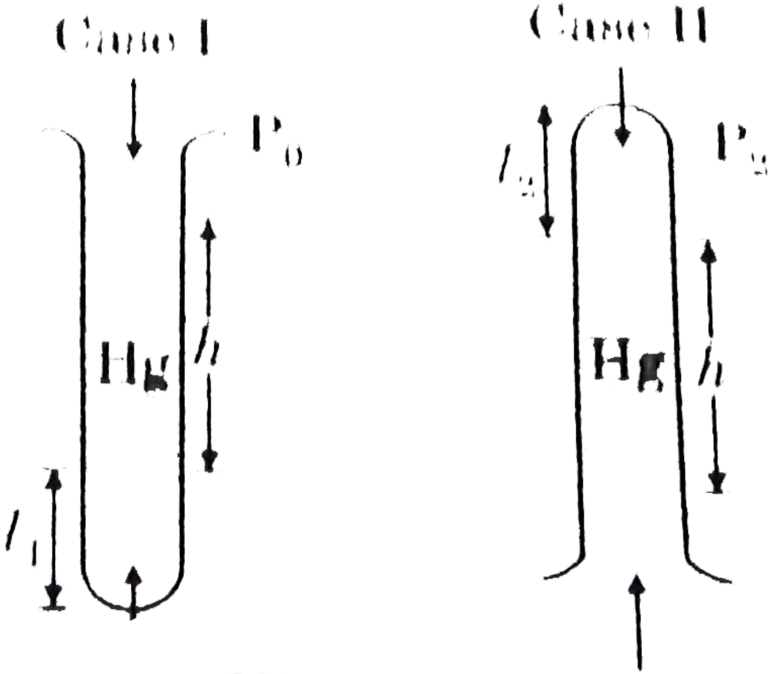
$$P_0 = \rho hg + P_{gas}$$

or $\rho gh = P_0 - P_{gas}$

A gas column is trapped between closed end of a tube and a mercury column of length (h) when this tube is placed with its open end upwards the length (h)when this tube is placed with its open end upwards the length of gas column is (l_1) the length of gas column becomes (l_2) when open end of tube is held downwards (as shown in figure) find atmospheric in terms of height of Hg column. (Assume temeperature remains constant)







A. $\dfrac{h(l_1 + l_2)}{l_2 - l_1}$

B. $\dfrac{h(l_2 + l_1)}{l_1 - l_2}$

C. $\dfrac{l_1 + l_2}{h(l_2 - l_1)}$

D. $(h_1 l_1 + h_2 l_2)$

Answer: a

Watch Video Solution

435.

	Column-I	Column-II
(a)	For a gas repulsive tendency dominates	(p)Effects in'
(b)	$At \quad T_B = -3^\circ C$ for a gas in high pressure region	(q)There is n
(c)	AtT_C	$(r) Z > 1$
(d)	For He gas at $0^\circ C$ in all pressure region	$(s) T_C = 80K$

Watch Video Solution

436. Match the following Column-I to Column-II

Column-I		Column-II	
(a)	$P_1V_1 = P_2V_2 = P_3V_3 = ...$	(p)	Dalton's law of partial pressures at constant temperature
(b)	$\frac{V_1}{T_1} = \frac{V_2}{T_2} = \frac{V_3}{T_3} = ...$ at constant pressure	(q)	Kinetic equation of an ideal gas
(c)	$r \propto \sqrt{\frac{1}{d}}$	(r)	22.7 litre for an ideal gas
(d)	$P = P_1 + P_2 + P_3 + ...$	(s)	Isotherm
(e)	$(V-b)\left(P + \frac{a}{V^2}\right) = RT$	(t)	Isobar
(f)	R/N_A	(u)	Charles' law
(g)	Molar volume at STP	(v)	Graham's law
(h)	$PV = \frac{1}{3} \text{mNc}^2$	(w)	Boyle's law
(i)	Graph between P and V at constant T	(x)	Equation for real gases
(j)	Graph between V and T at constant P	(y)	Boltzmann's constant

Watch Video Solution

437.

	Coloumn-I	Column-II
(a)	At low pressure	(p) $Z = 1 + \frac{pb}{RT}$
(b)	At high pressure	(q) $Z = 1 - \frac{a}{V_m RT}$
(c)	At low density of gas	(r) Gas is more compressible then ideal ga
(d)	f or H_2 and $Heat 0^\circ C$	(s) Gas is less compressible than ideal gas

Watch Video Solution

438. Match gases under specified conditions listed in Coloum-I with their properties//laws in Column-II.

	Column-I	Column-II
(a)	Hydrogen gas(P=200 atm T=273K)	(p)Compressibility facto
(b)	Hydrogen gas (p~0,T=273K)	(q) At tractive forces are
(c)	$CO_2(P = 1atm, T = 273K)$	(r) PV=nRT
(d)	Real gases with very large molar volume	(s)P(V-nb)=nRT

Watch Video Solution

439. Match of following (where U_{rms}=root mean square speed U_{av} =average speed U_{mp} = most probable speed)

	List-I	List-II
(a)	U_{rms}/U_{av}	$(p)1.22$
(b)	U_{av}/U_{mp}	(q)1.13
(c)	U_{rms}/U_{mp}	$(r)1.08$

Watch Video Solution

440.

	List-I(Van der Waals equation)	List-II(given by)
(a)	high pressure and low temperature	(p)PV=RT+Pb
(b)	low pressure	$(q)PV = RT - a/V$
(c)	Force of attraction is negligible	(r)PV=RT+aV
(d)	volume of molecule is negligible	$(s)\left[P + \frac{a}{V^2}\right](V - b) = RT$

Watch Video Solution

441. One mole of N_2 (g) is taken in 1 litre empty container fitted with a movable piston at 300 K at constant pressure then match the change (List-II) in parameters (List-I) of gas as compared to initial state and select the correct code.

	List-I(Parameter)	List-II(
(a)	Z_1(number of collisions made by a molecule per unit time)	(1) $\frac{1}{8}$
(q)	Z_{11}(collision frequency)	(2)2
(r)	λ(mean free path)	(3) $\frac{1}{2}$
(s)	U_{rms}(root mean square speed)	(4)4

A.

P	Q	R	S
2	4	1	3

B.

P	Q	R	S
1	2	4	3

C.

P	Q	R	S
3	4	1	2

D.

P	Q	R	S
2	1	4	2

Answer: (p-3);(q-1);(r-4);(s-2)

Watch Video Solution

442. Column-II gives the values of van der Waal's constant 'a' of a few gases which are shown in column-I Identify the gas with the corresponding 'a' value:

	Column-I	Column-II
(P)	H_2	(1) $137.8 kPa dm^6 mol^{-2}$
(Q)	He	(2) $21.8 kPa dm^6 mol^{-2}$
(R)	O_2	(3) $364.0 kPa dm^6 mol^{-2}$
(S)	CO_2	(4) $3.5 kPa dm^6 mol^{-2}$

Watch Video Solution

443.

	Column-I	Column-II
(a)	Gas at critical temperature	(p) Gas can be liquifi
(b)	Gas at Boyle's temperature and low pressure	(q) Deviate from idea
(c)	Compressibility factor Z < 1	(r) Gas follows the id
(d)	High temperature and low pressure	(s) Assumption of no

Watch Video Solution

444. Sample of different gases are given at different conditions in column-I and column-II consisting of translational kinetic energy of these gases at given conditions.

	Column-I	Column-II
(P)	$2mo \leq SO_2(g)at700K$	(1)Maximum K.E. per gram
(Q)	$1mo \leq SO_3(g)at400K$	(2)Maximum total K.E.
(R)	$4mo \leq CH_4(g)at300K$	(3)Maximum K.E. per gram
(S)	$2.5mo \leq He(g)at450K$	(4)Minimum K.E. per molecule

A.

P	Q	R	S
4	3	1	2

B.

P	Q	R	S
2	3	1	4

C.

P	Q	R	S
1	2	3	4

D.

P	Q	R	S
2	3	4	1

Answer: (d)

View Text Solution

445.

	Column-I	Column-II
(P)	If volume of gas molecules be negligible	(1)$\left(P+\frac{a}{V_2}\right)(V-b)=R$
(Q)	At very high pressure	(2)PV=RT+Pb
(R)	At low pressure and high temperature	(3)$PV=RT-\frac{a}{V}$
(S)	van der Waal's gas	(4)PV=RT

A. $\begin{matrix} P & Q & R & S \\ 3 & 2 & 4 & 1 \end{matrix}$

B. $\begin{matrix} P & Q & R & S \\ 2 & 4 & 1 & 3 \end{matrix}$

C. $\begin{matrix} P & Q & R & S \\ 3 & 4 & 1 & 2 \end{matrix}$

D. $\begin{matrix} P & Q & R & S \\ 2 & 3 & 1 & 4 \end{matrix}$

Answer: (a)

Watch Video Solution

446. 6 litres of H_2O is placed in a closed room of volume 827 litre and temperature at 300K if vapour pressure of liquid water is 22.8 mm of Hg at 300K and its density is $1gm/cm^3$ Then: [Given R=0.0821 $L-atm/mo \leq -K$ assuming volume of liquid water to be constant]

	Column-I
(P)	Mass of H_2O in gaseous state (gm)
(Q)	Moles of H_2O in gaseous state (in moles)
(R)	Total number of moles of oxygen gas that can be obtained from vapou
(S)	Total number of moles of all atoms from water in vapour form

A. $\begin{matrix} P & Q & R & S \\ 1 & 2 & 4 & 3 \end{matrix}$

B. | P | Q | R | S |
|---|---|---|---|
| 4 | 3 | 2 | 1 |

C. | P | Q | R | S |
|---|---|---|---|
| 2 | 4 | 1 | 3 |

D. | P | Q | R | S |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

Answer: (c)

Watch Video Solution

447. If two moles of an ideal gas at 546 K occupies a volume of 44.8 litres. Find out pressure (in atm)

Watch Video Solution

448. A glass tube with a sealed end is completely submerged in a vessel with mercury. The air column is 15 cm long. The what height (in cm) must the upper end be raised above the level of Hg so that the level of Hg inside the tube is at the level of Hg in the veseel ?

[Atmospheric pressure = 75 cm of Hg column]

Watch Video Solution

449. An ideal gas is trapped between a mercury column and the closed lower end of a narrow vertical tube of uniform bore. The upper end of the tube is open to atmosphere (atmospheric pressure = 76 cm of Hg). The length of mercury and the trapped gas columns are 20 cm and 43 cm respectively. What will be the length of the gas column when the tube is titled slowly at constant temperature in a vertical plane through an angle of 60° ?

Watch Video Solution

450. Two gases A and B having molecular weight 60 and 45 respectively are enclosed in a vessel. The weight of A is 0.5 g and that of B is 0.2 g. The total pressure of the mixture is 750 mm. Calculate the partial pressure (in mm) of gas A.

Watch Video Solution

451. Pressure in a bulb dropped from 2000 to 1500 mm in 50 minute when the contained oxygen leaked through a small hole. The bulb was then completely evacuated.A mixture of oxygen and another gas of molecular weight 72 in molar ratio $1:1$ at a total pressure of 6000 mm was introduced. Find the molar ratio of two gases remaining in the bulb after a period of 70 minute. If your answer is x then fill your OMR with $46x$ (Exclude decimal places)

Watch Video Solution

452. Calculate the volume (in litre) occupied by 4 mole of a van der Waal's gas present at a temperature of $400K$ and exerting a pressure of 2 atm if van der Waal's constant a and b are respectively $33.256Pa - m^6/mol^2$ and $10^{-2}m^3/\text{mole}$. $\left[\text{Given}: R = 0.0821\text{atm-lit}/\text{mo}\right.$

Watch Video Solution

453. Find he number of diffusion steps required to separated the isotopic mixture initially containing some amound of H_2 gas 1 mol of D_2 gas in a container of 3 litre capacity maintained at 24.6 atm and $27^\circ C$ to the final mass ratio $\left(\frac{W_{D_2}}{W_{H_2}}\right)$ equal to $\frac{1}{4}$

Watch Video Solution

454. Calculate pressure exerted by 1 mole of a van der Waal's gas at a temperature of $\frac{8}{0.0821}K \text{in a} \frac{1}{2}L$ container if volume of the molecule is assumed to be negligible and van der Waal's contant $a = 2\text{atm-lit}^2\text{mole}^{-2}$

Express answer in atm.

Watch Video Solution

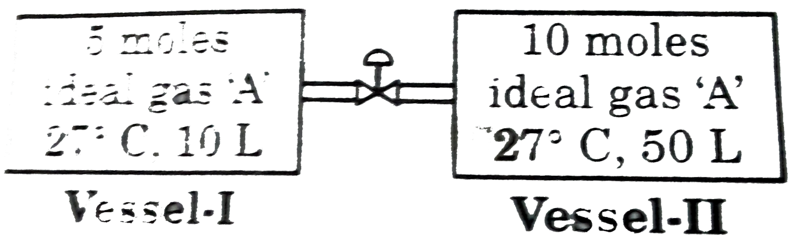
455. A vessel of 10 L capacity contains 4 g He gas. The vessel is heated such that its absolute temperature becomes double. In order to make the pressure of gas half of its initial pressure, the mass of gas (in g) which should be removed from the vessel is :

(Assume no change in the capacity of vessel) :

Watch Video Solution

456. Cycle tubes, each of capacity 4 L are to be filled by N_2 gas at 5 atm and $300K$. The gas is present in a many tubes can be completely inflated by connecting the cylinder with tubes.

Watch Video Solution

457. 

The volume of connecting tube is negligible. Now, the stopcock is opened.

The temperature of both vessels are maintained at $27^\circ C$

$$\left[\text{Take}: R = \frac{1}{2} \text{L atm/mol K}\right]$$

Codes	Description for final condition
01	2.5 moles of gas will transfer from vessel-I to vessel-II
02	2.5 moles of gas will transfer from vssel-II to vessel-I
03	Final moles of gases in both vessels will be same
04	Final pressures of gases in both vessels will be same

Fill OMR as sum of correct codes.

Watch Video Solution

458. $22.4 L C_2H_6$ gas at $0^\circ C$ 1 atm is burnt in excess of O_2 gas. The products are passed through 5 L of 2 M KOH solution. The maximum moles of K_2CO_3 which may form in the solution is :

Watch Video Solution

459. A container with a volume of $20.0 L$ holds $N_2(g)$ and $H_2O(l)$ at $300 K$ and 1.0 atm. The liquid water is then decomposed completely into $H_2(g)$ and $O_2(g)$ by any means, at constant temperature. If the final pressure becomes 1.86 atm, what was the mass of water (in gm) present initially. Neglect the initial volume of water. [Given : Vapour pressure of water at 300 K = 0.04 atm, R = 0.08 L-atm/K-mol]

Watch Video Solution

460. A column of mercury of 10cm length is contained in the middle of a narrow horizontal 1m long tube which is closed at both the ends. Both the halves of the tube contain air at a pressure of 76 cm of mercury. By what distance will the column of mercury be displaced if the tube is held vertically?

Watch Video Solution

461. Assuming the same pressure in each case, calculate the mass of hydrogen (in g) required to inflate a balloon to a certain volme V at $127^{\circ}C$ if 8g helium is required to inflate the balloon to half the volume, $0.50V$ at $27^{\circ}C$.

Watch Video Solution

462. At $20^\circ C$, two balloons of equal volume and porosity are filled to a pressure of $2atm$, one with $14kgN_2$ and the other with $1Kg$ of H_2. The N_2 balloon leaks to a pressure of $1/2atm$ in $1hour$. How long will it take for the H_2 balloon to reach a pressure of $1/2atm$?

Watch Video Solution

463. The pressure in vessel that contained pure oxygen dropped from 2000 torr to 1500 torr in 40 min as the oxygen leaked through a small hole into a vacuum. When the same vessel was filled with another gas, the pressure dropped from 2000 torr to 1500 torr in 80 min. What is the molecular weight of the second gas ?

Watch Video Solution

464. For 10 minutes each, at $0^\circ C$, from two identical holes nitrogen and an unknown gas are leaked into a common vessel of 4 litre capacity. The resulting pressure is 2.8 atm and the mixture contains 0.4 mole of nitrogen. What is the molar mass of unknown gas ? (Take $R = 0.821 \text{L-atm mol}^{-1} K^{-1}$]

Watch Video Solution

465. At what temperature in $.^{\circ} C$ would the most probable speed of CO_2 molecules be twice that at $127^{\circ} C$?

Watch Video Solution

466. The density of water vapour at 240 atm and $527^{\circ} C$ is $90 g / dm^3$. Determine the molar volume, V_m of water and the compression factor. [Use : $R = 0.8 \text{at mL/mol K}]$. Hence, write the value of $4Z$.

Watch Video Solution

467. A spherical balloon of 21 cm diameter is to be filled up with hydrogen at 1 atm, 273 K from a cylinder containing the gas at 20 atm and $27^{\circ} C$. If the cylinder can hold 2.82 litre of water, calculate the number of balloons that can be filled up completely.

Watch Video Solution

468. At $27^{\circ} C$, hydrogen is leaked through a tiny hole into a vessel for 20 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 ?

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

Watch Video Solution

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

Watch Video Solution

470. At $400K$, the root mean square (rms) speed of a gas X (molecular weight = 40) is equal to the most probable speed of gas Y at 60 K. The molecular weight of the gas Y is.

Watch Video Solution

471. A valve between a 5 litre tank in which the gas pressure is 9 atm and a 10 litre tank containing gas at 6 atm is opened and pressure equilibration ensures at a constant temperature. What is the final pressure (in atm) in the two tanks ?

Watch Video Solution

472. In a basal metabolism measurements timed at 6.0 minute a patient exhaled 52.5 litre of air measured over water at $20^{\circ}C$ The vapour pressure of water at $20^{\circ}C$ is 17.5 torr The barometric pressure was 750 torr. The exhaled air analysed 16.75 volume per cent of oxygen and inhaled air 20.32 percent oxygen, both on a dry basis Neglecting any solubility f the gases in water and any difference in the total volume of inhaled and exhaled air, calculate rate of oxygen consumption by the patient in mL (STP) per minute

Watch Video Solution

473. Two vessels whose volumes are in the ratio $2:1$ contains nitrogen and oxygen at 800 mm and 680 mm pressure respectively, when they are connected together, what will be the pressure (in cm of Hg) of the resulting mixture ?

Watch Video Solution

474. A gas mixture contains equal number of molecules of N_2 and SF_6. Some of it is passed through gaseous effusion apparatus. Calculate how many molecules of N_2 are present in the product gas for every 100 molecules of SF_6. [At. Wt. of $F = 20$]

Watch Video Solution

Watch Video Solution

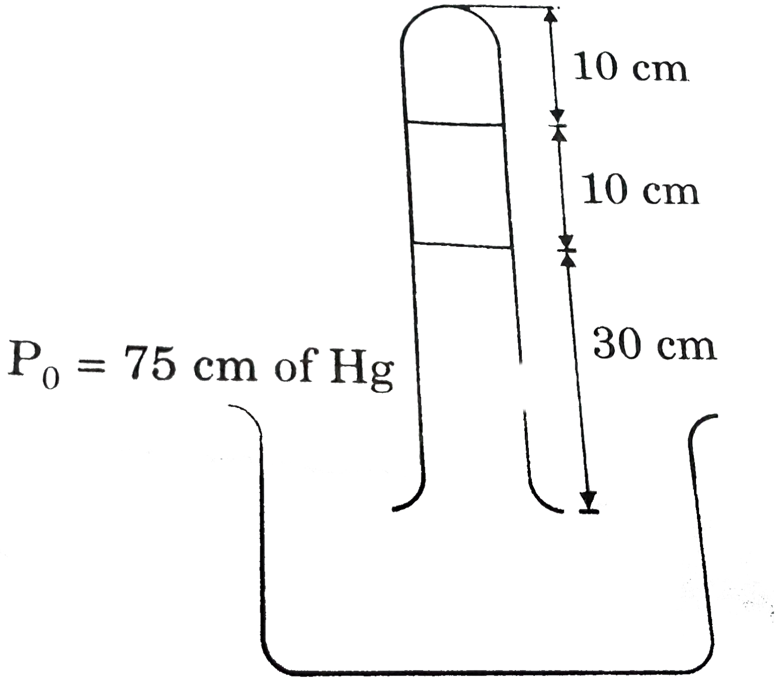
475. Find the critical constant $(P_C, V_C$ and $T_C)$ in terms of A and B, also find compressibility factor (z) for the following equation of state

$$PV = RR - \frac{A}{V} + \frac{2B}{V^2}$$

where A and B are constants, P = pressure and V = molar volume. Hence, write the value of $\frac{1}{Z_C}$.

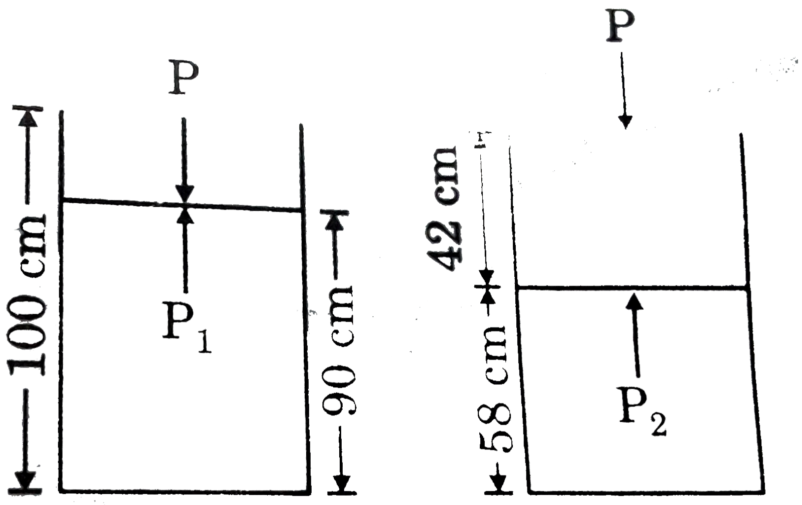
View Text Solution

476. A tube of length 50 cm is containing a gas in two secitons separated by a mercury column of length $10cm$ as shown in figure. The tube's open end is just inside the Hg surface in container, find pressure of gas in upper section. [Assume atmospheric pressure = 75 cm of Hg column]



Watch Video Solution

477. A vertical cylinder of total length 100 cm is closed at the lower end and is fitted with a movable frictionless gas tight disc at the other end. An ideal gas is trapped under the disc. Initially the height of the gas column is 90 cm when the disc is in equilibrium between the gas and the atmosphere. Mercury is than slowly poured on the top of the disc and it just starts overflowing when the disc has descended through 32 cm. Find the atmospheric pressure (in cm of Hg). Assume that the temperature of the gas to remain constant and neglect the thickness and weight of the disc. Give your answer excluding the decimal places.

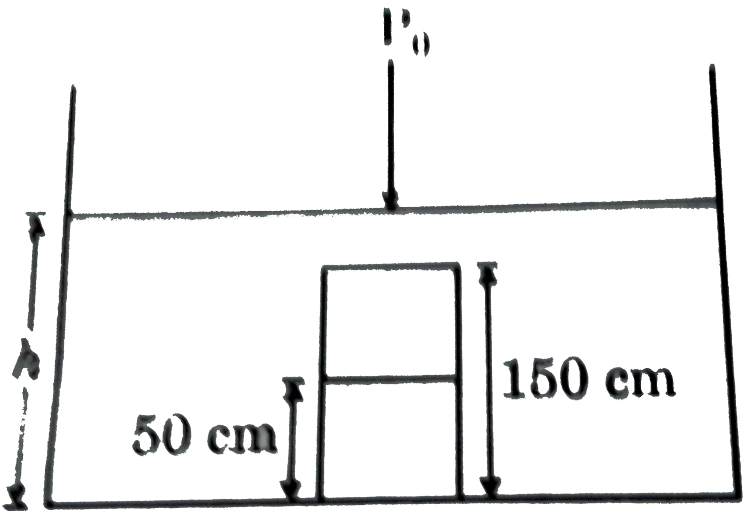


Watch Video Solution

478. To an evacuated vessel with movable piston under external pressure of 1 atm 0.1 mole of He and 1.0 mole of an unknown compound vapour pressure 0.68 atm at $0^\circ C$ are introduced Considering the ideal gas behaviour the total volume (in litre) of the gases at $0^\circ C$ is close to .

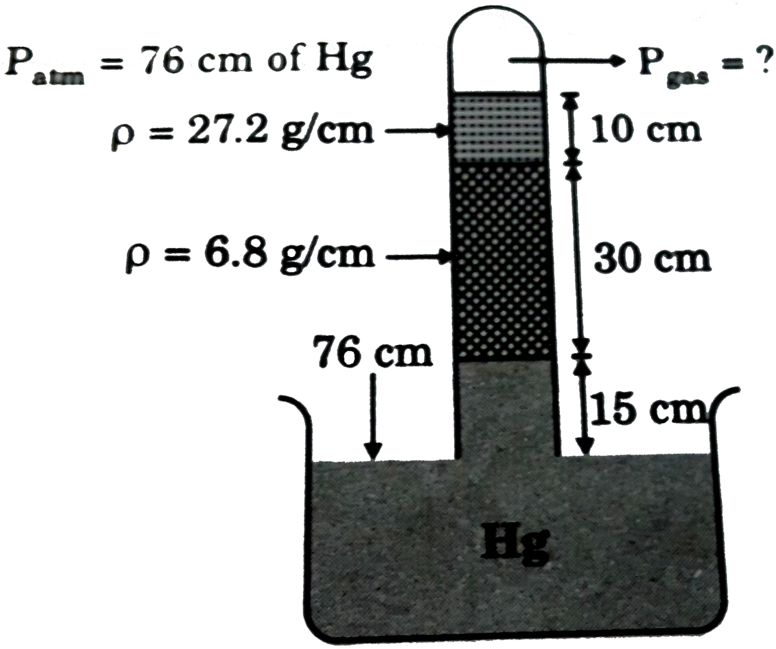
Watch Video Solution

479. A cylindrical diving bell (initially in open air), whose length is 150 cm is lowered to the bottom of a tank. The water is found to rise 50 cm in the bell. Find the depth of the tank. Assume the atmospheric pressure at the surface as equivalent to 1000 cm of water and the temperature as constant



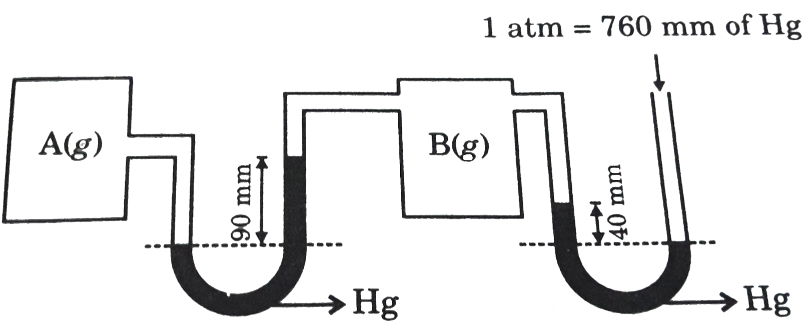
Watch Video Solution

480. In the following arrangement find the pressure of the confined gas in cm of Hg



Watch Video Solution

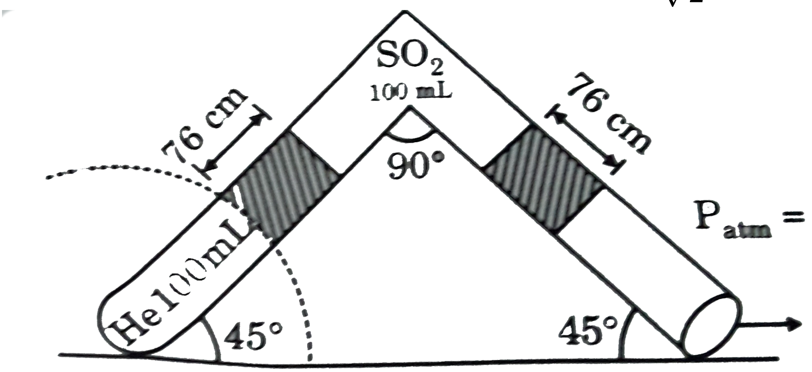
481. At $300K$, two gases are filled in two equal sized containers as given



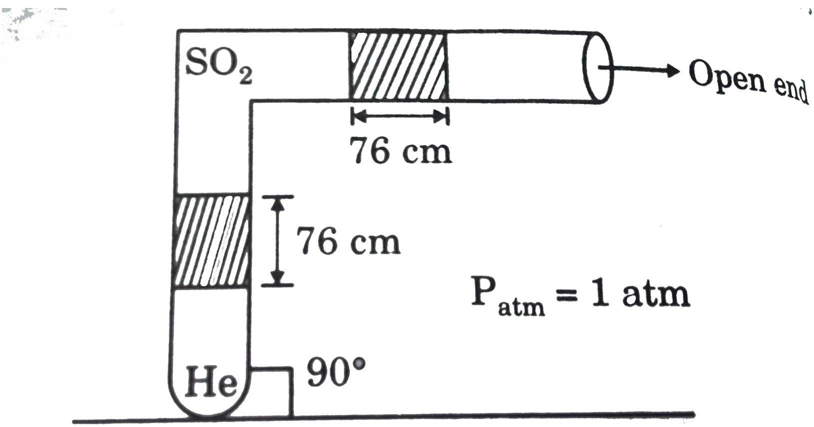
What will be the pressure of A(g) (in mm of Hg) ?

Watch Video Solution

482. A thin glass tube (uniform cross-section) is filled with He and SO_2 in between Hg column as shown in diagram. When it is rotated by angle 45° anticlockwise as shown in diagram, calculate the sum of final volume of both gases (Assume T remains constant) [Use : $\frac{1}{\sqrt{2}} = 0.7$]

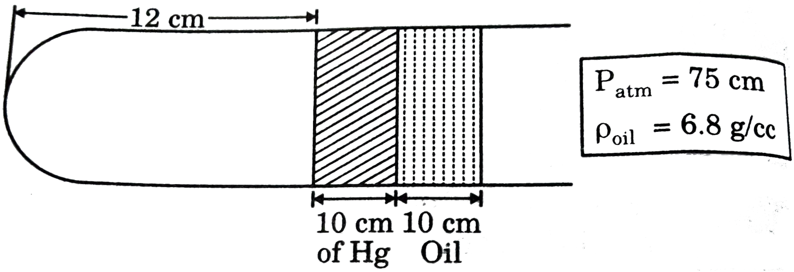


Initially



Finally

Watch Video Solution

483. 

If above tube is held vertical with open end upward then find the length of air column (in cm).

Watch Video Solution

484. An unknown gas behaves ideally at 540 K in low pressure region, then calculate the temperature (in K) below which it can be liquefied by applying pressure.

Watch Video Solution

485. A flask has 10 molecules out of which four molecules are moving at $7ms^{-1}$ and the remaining ones are moving at same speed of Xms^{-1}. If rms of the gas is $5ms^{-1}$, what is X ?

Watch Video Solution

486. Two flask of equal volume are connected by a narrow tube (of negligible volume) are at $27^{\circ}C$ and contain 0.7 moles of H_2 each at 0.5 atm. One of the flask is then immersed into a bath kept at $127^{\circ}C$, while other remains at $27^{\circ}C$. If number of moles of H_2 in flask 1 and flask 2 finally, are a and b respectively, then calculate value of $10 \times |a-b|$.

Watch Video Solution

487. The van der Waal's constants for a gas are $a=1.92$ atm $L^2\text{mol}^{-2}, b=0.06L\text{mol}^{-1}$. If $R=0.08L$ atm $K^{-1}\text{mol}^{-1}$, what is the Boyle's temperature (in K) of this gas ?

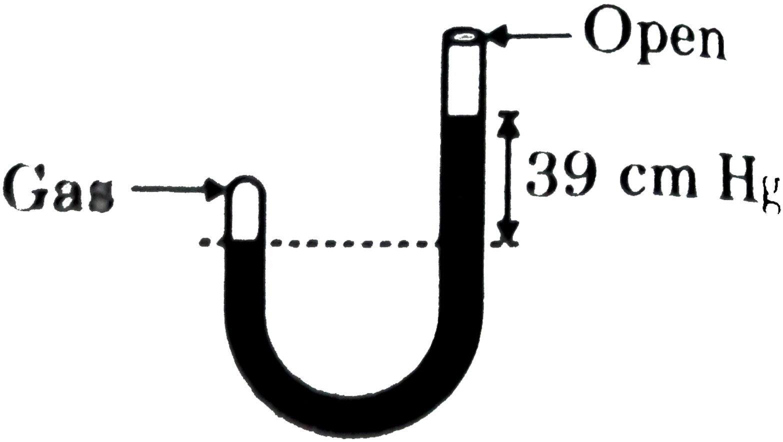
Watch Video Solution

Watch Video Solution

488. Calculate the mole present of N_2 gas in a mixture of N_2 and O_2 if the partial pressure of O_2 is 6.3 cm of Hg in a container of volume 22.4 litre and total pressure is 90 cm of Hg at $300K$

Watch Video Solution

489. Some gas is present in J-shaped tube and in this case level of mecury in both limbs of tube differ by 39 cm of Hg. If mercury is replaced by another liquid of density $\frac{3}{4}$ of density of mercury then find the height difference in limbs. Assume temperature to be constant and smaller limb is closed, (density of mercury 13.6 g/mL)



Watch Video Solution

490. The density of a mixturee of O_2 and N_2 gases at 1 atm and 273 K is 0.0013 gm/mL. If partial pressure of O_2 in the mixture is A, then calculate value of 25 A.

Watch Video Solution

491. One litre gaseous mixture is effused in 4.5 minutes and 30 seconds while 1 litre of oxygen takes 10 minutes for effusion. The gaseous mixture contains in it ethane and hydrogen. Calculate vapour density of gaseous mixture.

Watch Video Solution

492. Gas A taken in a closed rigid container is allowed to decompose partially according to the reaction

$A(g) \rightarrow 2B(g) + 3C(g)$

The gaseous mixture formed effuses 1.5 times faster than a gas having molecular weight 105 under similar conditions. Find the mole fraction of C in the gaseous mixture formed

Given : Mol. wt. of $A = 140$

Mol. wt. of $B = 64$

Mol. wt. of $C = 4$

Write your answer by multiplying with 10.

Watch Video Solution

493. For a real gas critical pressure is 75 atm and van der Waal's constant 'b' is 40 millilitres per mole. If critical temperature of gas is TK. Calculate value of $\left(\frac{T}{100}\right)$. $\left[\text{Use} R = 0.08 \text{L atm mol}^{-1} K^{-1}\right]$.

Watch Video Solution

494. 2 moles of $NO(g)$ and 16 gm of $O_2(g)$ were mixed in a 6.25 litre vessel at $27^{\circ} C$ temperature to produce maximum amount of $NO_2(g)$

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

$\left(\text{Use}: R = \frac{1}{12} \text{L-atm mol}^{-1} K^{-1}\right)$

Calculate change in pressure (in atm) due to this reaction.

Watch Video Solution

495. If the mean free path is 10 cm at one bar pressure, then, its value in cm at 5 bar pressure, if temperature is kept constant will be :

Watch Video Solution

496. Average translational kinetic energy of an ideal gas molecule at $27^\circ C$ is $3.88 \times 10^{-x} eV$. Hence x is :

Watch Video Solution

497. H_2 and O_2 are kept in mass ratio $1:8$ respectively at 6 atm. If small orifice is made then relative rate of effusion of H_2 with respect to O_2 initially is :

Watch Video Solution

498. Calulate the mole fraction of N_2 gas in a mixture of N_2 and O_2. If the partial pressure of O_2 is 63 of Hg and the total pressure of the mixture is 90 cm of Hg. First multiply your answer with 10, then fill OMR.

Watch Video Solution

499. If at 200 K and 500 atm, density of CH_4 is $0.246g/mL$ then its compressibility factor (Z) is approximately 2.0×10^x then x is :

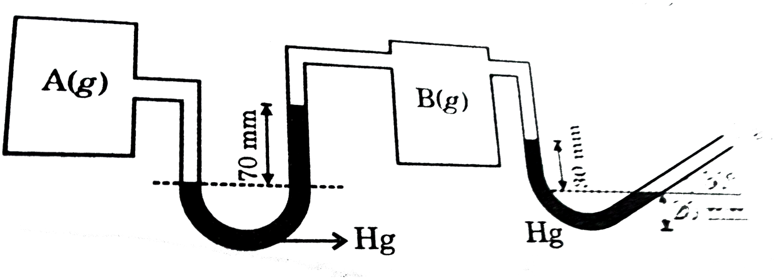
Watch Video Solution

500. Density of ideal gas at 2.46 atm and 300 K is $0.8g/L$ Hence g-molar mass of gas is :

$[R = 0.082\text{L-atm/mol-K}]$

Watch Video Solution

501. At 300 K two gases are filled in two equal sized containers as given



What will be the pressure of A(g) (in mm of Hg) ?

Watch Video Solution

502. A container contains air above liquid water. Total pressure was 800 torr. What will be the final pressure if volume is doubled ? (Aqueous tension = 40 torr).

Watch Video Solution

503. If 10 moles of a real gas is present in 2 litre container having a free volume of 1600 mL at pressure P and temperature T, then at what pressure in atmosphere and at 273 K its compressibility factor is 1.5 ? (neglect α)

Watch Video Solution

504. Absolute temperature of diatomic has in increased eight fold, where it dissociates completely into atom. How many time will be the new rms velocity-compared to initial ?

Watch Video Solution

505. Two flasks A and B have equal volume at $100K$ and $200K$ and have $4atm$ and $1atm$ pressures, respectively. The flasks A contains H_2 gas and B contains CH_4 gas. The collision diameter of CH_4 is twice that of H_2.

(i) Which of the following is true about the mean free path (λ) of the molecules?

(a) λ of H_2 is twice that of CH_4.

(b) λ of CH_4 is twice that of H_2.

(c) λ of H_2 is four times that of CH_4.

(d) λ of CH_4 is four times that H_2.

(ii) Which of the following is true about the viscosity of the gases?

(a) Viscosity of $H_2 = 2 \times$ viscosity of CH_4

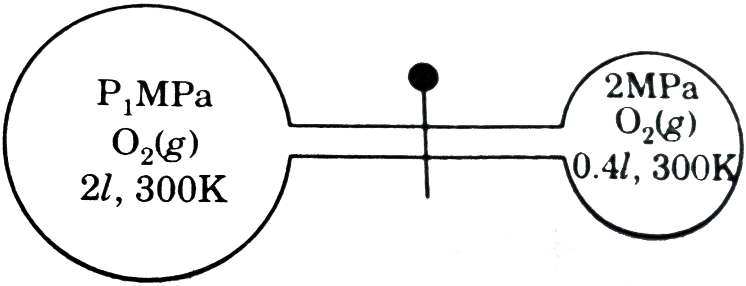
(b) Viscosity of $H_2 = 3 \times$ viscosity of CH_4

(c) Viscosity of $H_2 =$ viscosity of CH_4

(d) Viscosity of $H_2 = \frac{1}{2} \times$ viscosity of CH_4

Watch Video Solution

506. If in below diagram after opening valve, final pressure is $\frac{7}{6}$ Mpa, then calculate P_1 (in MPa)



Watch Video Solution

507. An ideal gas occupies 2 litres volume at 300 K and 1 atm. Calculate the volume occupied by equal moles of real gas at same temperature and pressure

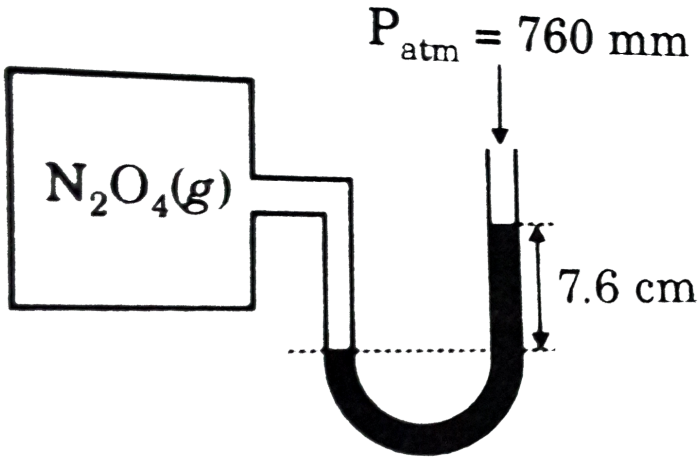
Given : $b = 0.05$ litre/mol

$R = 0.08$ atm

$Z = 1.5$ at given condition.

Watch Video Solution

508. In a container initially only N_2O_4 is present and no difference in height of Hg-column of two limbs :



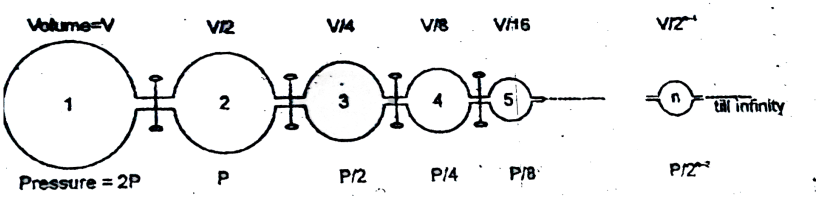
If due to dissociation of N_2O_4 at constant temperature the difference in the column of mercury becomes 7.6 cm then calculate $\%$ dissociation of N_2O_4. $[N_2O_4 \rightarrow 2NO_2]$

Watch Video Solution

509. At $30^{\circ}C$ dry air $[75\,\%\,N_2 + 25\,\%\,O_2]$ is placed over $H_2O(l)$ at 800 torr (combined pressure of all 3 gases). If pressure is gradually increased isothermally to 1560 torr, then calculate partial pressure of O_2 at this pressure in torr.

$[VP_{H_2O} = 50\text{torr at}30^\circ C]$

Watch Video Solution

510. 

Inifinite number of flasks are connected to one another as shown above. The volume and pressure in each flask vary as shown. The stopcocks are initially closed. The common pressure, when all the stopcocks are opened, is : (Assume constant temperature)

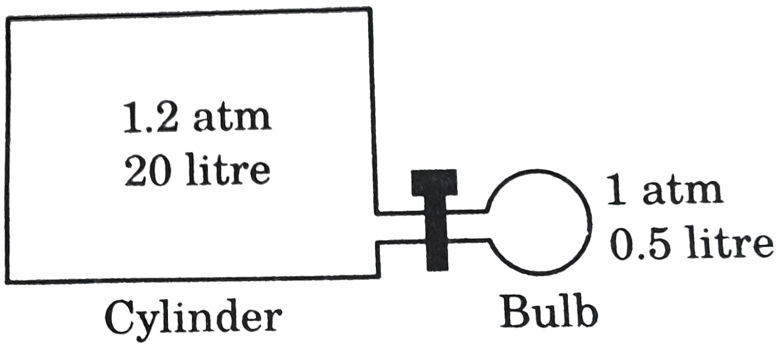
Watch Video Solution

511. In 1 litre rigid vessel at 1 atm and 300 K, N $\text{collision/sec-cm}^2$ of gas is observed with container's wall. If temperature is increased to $1200K$, $xN\text{collision/sec-cm}^2$ is observed for gas. Hence x is

Watch Video Solution

Watch Video Solution

512. 0.5 L of evacuated container is filled by gas upto 1 atm exactly, by connecting it to 20 litre cylinder initially at 1.2 atm. How many evacuated containers can be filled ?



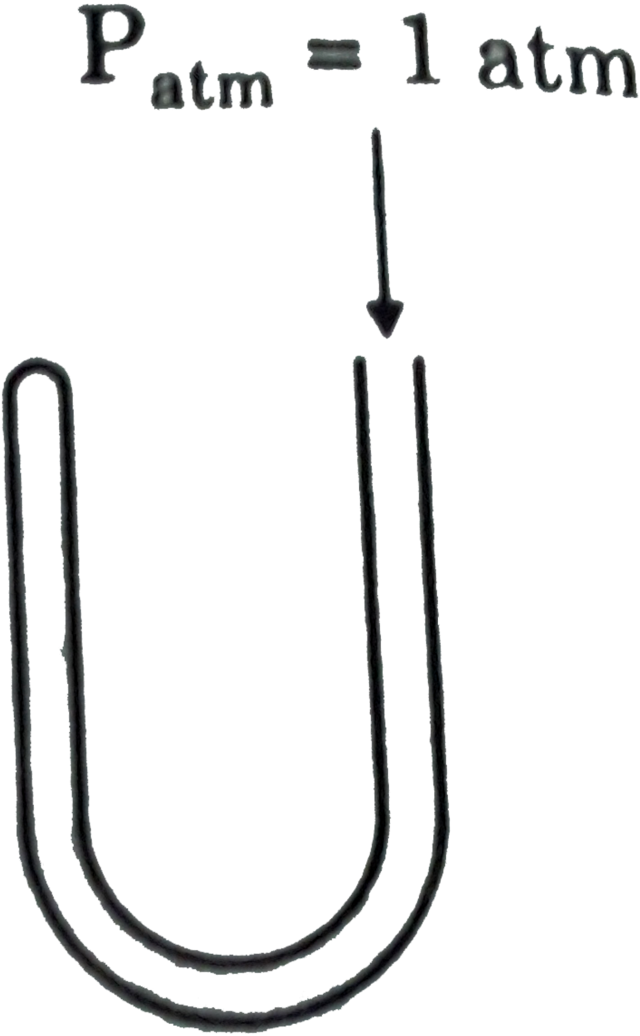
Watch Video Solution

513. At constant pressure mean free path of ideal gas $\lambda \propto T^{x}$. Hence, 'x' is :

Watch Video Solution

514. 100 mL of a gas is stored over mercury in mercury manometer at $27^\circ C$ radius of inside column is r and that of outside is R and initially mercury level is equal in both column

(a) If $R = r$. Find the new temperature (in K) if due to change in temperature outside level of mercury is raised by 20 mm

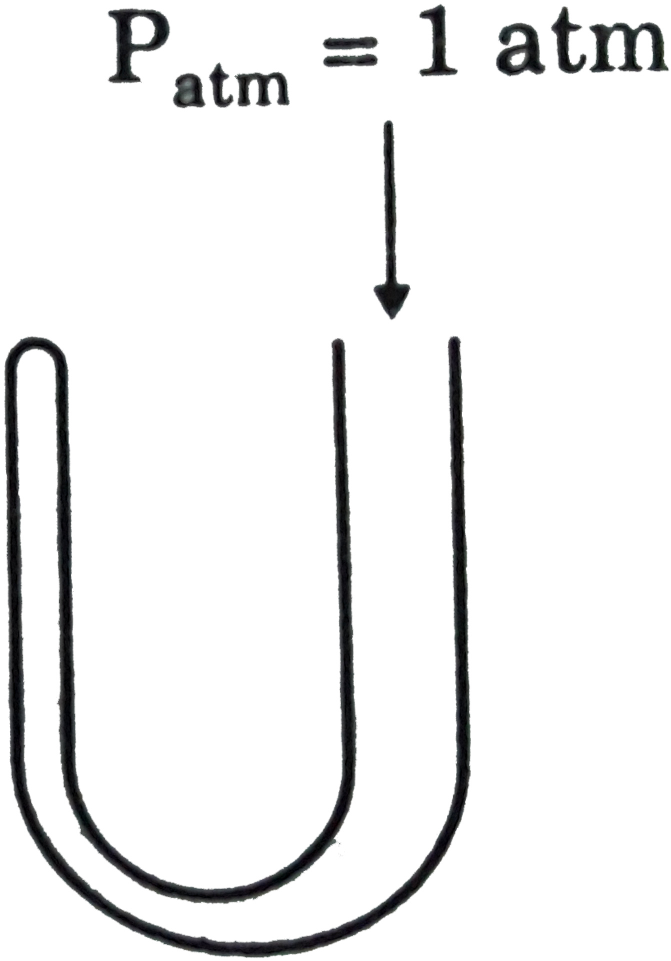


(i) Assume volume of gas remain constant by some experimental means

$\Rightarrow T_1$

(ii) Volume does not remain constant $\left(\pi r^2 = 10cm^2\right) \Rightarrow T_2$

(b) If $R = 2r$ and inside level falls by $80mm \Rightarrow T_3$



Give the answers by adding T_1, T_2, T_3 to the nearest integer.

View Text Solution

515. A good vacuum produced in common lab apparatus corresponds to 10^{-6} torr at $25^{\circ}C$. Calculate number of molecules per cubic centimeter at this T and P. In scientific notation, $x \times 10^y$. Find the value of y.

Watch Video Solution

516. An ideal gas at 650 Torr occupies a bulb of unknown volune. A certain amount of gas is withdrawn and found to occupy $1.52 cm^3$ at one atm. The pressure of the gas remaining in the bulb is 600 Torr. Calculate volume of the bulb (in mL) taking temperature constant. Give answer excluding decimal places.

Watch Video Solution

517. On litre flask contains air, water vapour and a small amount of liquid water at a pressure of 200 mm Hg. If this is connected to another one litre evacuated flask, what will be the final pressure of the gas mixture at equilibrium ? Assume $T = 50^\circ C$, aqueous tension at $50^\circ C$ is 93 mm Hg. Give answer excluding the decimal places.

Watch Video Solution

518. A diver at a depth of 10 m exhales a bubble of air of volume 24.63 mL. The bubble catches an organism which survives on the exhaled air trapped in the bubble. Find out what will be the volume [x in mL] of the bubble when it reaches the surface after 10 min. The organism just inhales the air at the rate of 0.05 millimoles per minute and exhales nothing, Also find out the average rate [y in m mol/min] at which organism should inhale so that volume of bubble remains constant at the depth and the surface. Hence, find the value of $\frac{x}{y}$ excluding decimal places

[Given : P atm = 1 atm , $d(H_2O) = g/cm^3, g = 1000cm/s^2, T_{H_2O} = 200K$ (throughtout)].

Watch Video Solution

519. The gas 'A' decomposes as $A \rightarrow B + 5C$

A partially decomposed gaseous mixture is allowed to effuse through a pin hole and the gas coming out initially was analysed. The mole fraction of C in effused gas was found to be 0.6. Determine :

(a) ratio of ratio of effusion of 'C' and 'B'

(b) the precentage of dissociation of 'A'. (Give answer excluding the decimal places)

[Given : Molecular mass of A = 360,

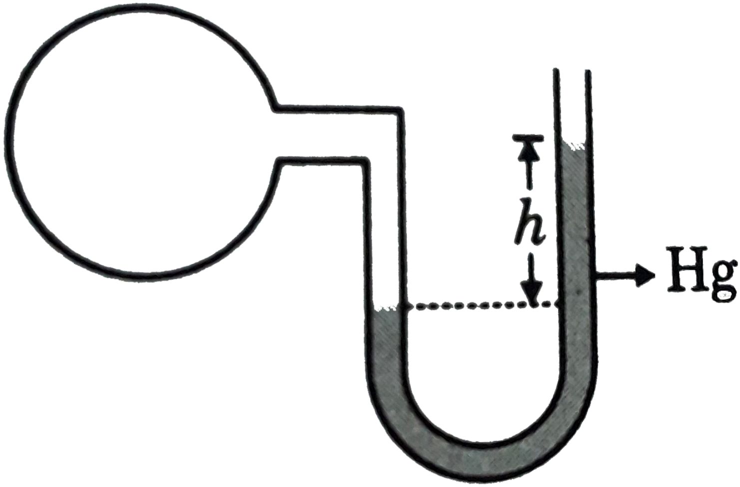
Molecular mass of C = 40]

Hence, fill OMR answer of (a) and (b) with the value of $\frac{(b)}{(a)}$

Watch Video Solution

520. A bulb of constant volume is attached to a very thin manometer tube as shown in figure. Gas starts leaking through a small hole in the bulb causing change in pressure as :

$$\frac{dp}{dt} = -kP^2$$



When k is constant and `P is pressure at any instant

Initial height difference 'h' was 76 cm and after 10 mm 'h' was 38 cm.

Watch Video Solution

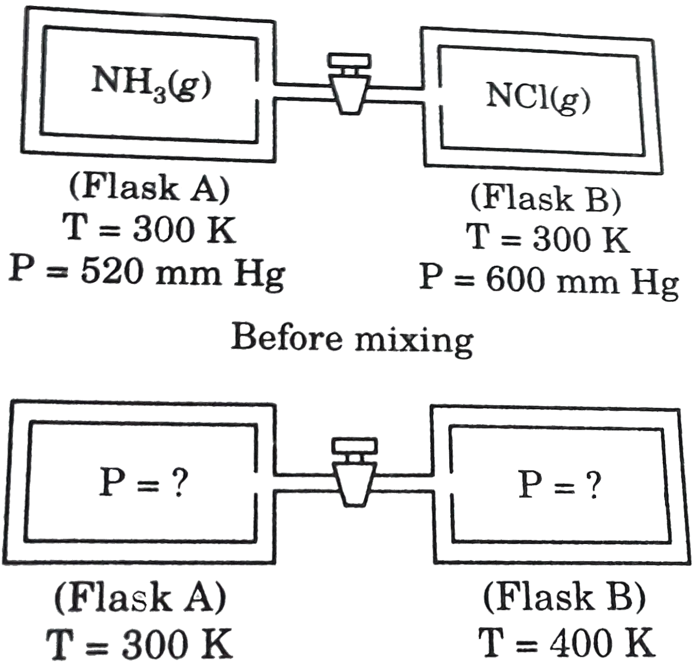
521. For oxygen at $25^{\circ}C$, the collision diameter is 0.361 nm. What is the mean free path (in m) for oxygen molecules at (a) 1 atm pressure and (b) 0.1 Pa pressure ?

In scientific notation, if your answer is $x \times 10^{y}$ then fill y in OMR.

Watch Video Solution

522. Two flasks A and B of equal volume containing NH_3 and HCl gases, are connected by a narrow tube of negligible volume. The two gases were prevented from mixing by stopper fitted in connecting tube. For further details of the experiment, refer to the given figure. What will be final pressure (in mm of Hf) in each flask when passage connecting two tubes are opened, assuming ideal gas behaviour of NH_3 and HCl gas and the reaction

$NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$ goes to completion.



Watch Video Solution

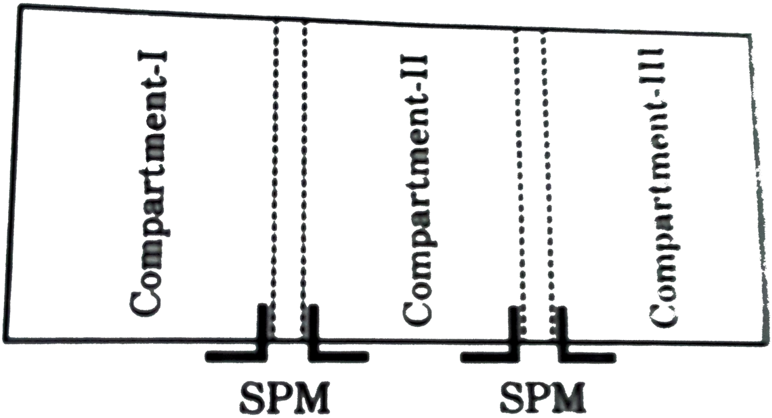
523. $22.4 L CH_4$ at 1 atm and 273 K was thought to have mass 16 g but when weighed experimentally it was found to have 17.5 g due to the pressure of carbon-14. Calculate $\%$ of carbon atom having atomic mass '14'.

Watch Video Solution

524. Two glass bulbs A and B 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 was empty. On opening th stop cock. The pressure fell down to 40%. The volume of the bulb B must be:

Watch Video Solution

525. A mixture of H_2, He and O_2 with mass ratio equal to the ratio of their atomic weight is present in compartment-II of a cylinder as shown in figure. The SPM is fixed by stoppers such that it divides the cylinder into three equal parts. Find the ratio of pressure in the three parts at equilibrium.

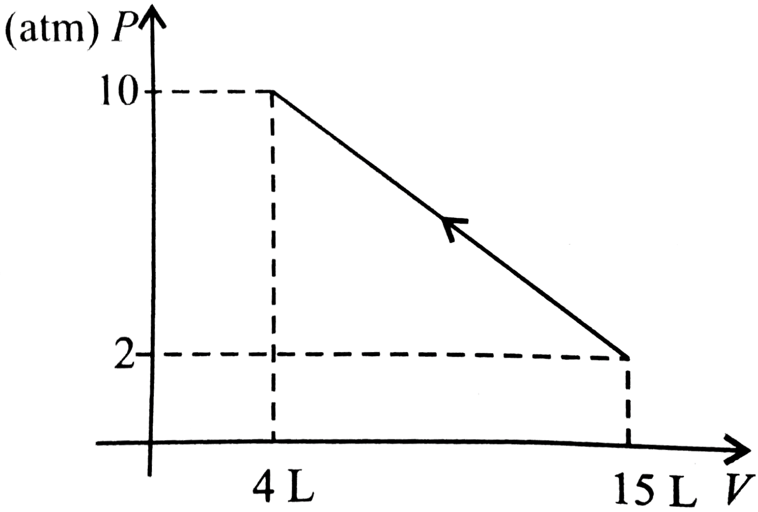


[If the answer is a : b: c then fill in OMR sheet as $a+b+c$. For example if $2:6:8$ then $1+3+4=8$]

Watch Video Solution

526. $1mol$ of a gas is changed from its initial state $(15L, 2atm)$ to final state $(4L, 10atm)$. If this change can be represented by a straight line in

$P-V$ curve, calculate the maximum temperature that, the gas attained.



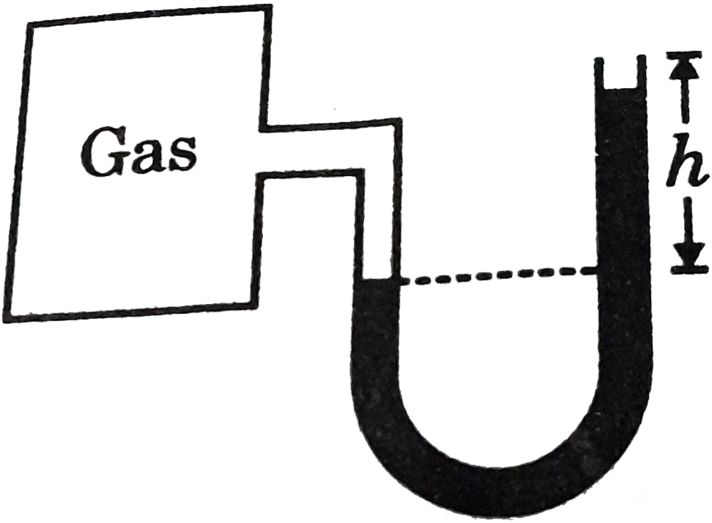
Watch Video Solution

527. $PCl_5(g)$ density (in g/L) of mixture at 24 atm and $300K$, when $PCl_5(g)$ undergo 50% decomposition. $\left[R = 0.08 \text{atm L mol}^{-1} K^{-1}\right]$

Watch Video Solution

528. If the gas in container gas pressure 77 cm of Hg, then calculate the height difference in manometer (in mm) which contain glycerine

$(d = 3.4g/mL)$.



Watch Video Solution

529. One litre of N_2 and 2 litre of O_2 under identical conditions of T and P are mixed. Find the volume of mixture if the pressure of the mixture is reduced to half of initial value.

Watch Video Solution

530. For a real gas, if at critical conditions molar volume of gas is $8.21L$ at 3 atm, then critical temperature (in K) will be :

Watch Video Solution