CHEMISTRY

BOOKS - MODERN PUBLICATION CHEMISTRY (KANNADA ENGLISH)

STATES OF MATTER

Multiple Choice Questions Level I

1. For a given mass of a gas, if pressure increases :

A. Volume and temperature remain constant

B. Volume decreases provided temperature remains constant.

C. Temperature increases provided volume remains constant

D. Temperature decreases provided volume remains constant.

Answer: C

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2. For a given mass of a gas at constant temperature. If the volume V becomes four times, the pressure p

will become :

A. 4p

B. $p/4$

C. 2p

D. $4p/T$

Answer: B

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3. Measurement of the amount of dry gas collected over a water from volume of moist gas is based on :

A. Gay Lussac's law

B. Boyle's law

C. Charles' law

D. Dalton's law of partial pressure.

Answer: D

4. At constant temperature, the pressure of V mL of a dry gas was increased from 1 atm to 3 atm. The new volume will be :

A. 3V

B. $V/3$

C. V^3

D. $2V^3$

Answer: B

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5. If V_1 mL of a gas at $37^\circ C$ and 1.2 atm pressure contains N_1 molecules and V_2 ml of the gas contains N_2 molecules at the same temperature and pressure, then :

A. $\frac{V_1}{V_2} = \frac{N_2}{N_2}$

B. $\frac{V_1}{N_2} = \frac{V_2}{N_2}$

C. $\frac{V_1}{N_2} = \frac{N_1}{N_2}$

D. $V_1 N_1 = V_2 N_2$

Answer: C

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6. For a given mass of a gas , if pressure is reduced to half and its temperature is doubled, then volume V will become :

A. 4V

B. $2V^2$

C. $V/4$

D. 8V

Answer: A

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7. In the ideal gas equation, the gas constant R has the units :

A. litre mol^{-1}

B. erg mol^{-1}

C. litre atm $mol^{-1}\ K^{-1}$

D. ml atm $mol^{-1}K$

Answer: C

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8. The value of gas constant R in joules is :

A. 8.314 $JK^{-1}mol^{-1}$

B. 0.0821 $JK^{-1}mol^{-1}$

C. $8.314 \times 10^{7} JK^{-1}mol^{-1}$

D. $1.99 JK^{-1}mol^{-1}$

Answer: A

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9. For ideal gases pV/nRT is :

A. 1. equal to 0

B. 2. equal to 1

C. 3. less than 1

D. 4. greater than 1

Answer: B

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10. According to combined gas law.

A. $pV \propto \frac{1}{V}$

B. $\frac{p}{T} \propto V$

C. $pV \propto T$

D. $\frac{V}{T} \propto p$

Answer: C

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11. At high altitudes the boiling point of water gets lowered because

A. 1. temperature is low

B. 2. atmospheric pressure is low

C. 3. pressure is high

D. 4. none of these

Answer: B

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12. The gram molar volume of a gas is the volume occupied at S.T.P. by

A. one gram of the gas

B. 6.02×10^{23} grams of the gas

C. 22.4 g of the gas

D. one gram mole of the gas

Answer: D

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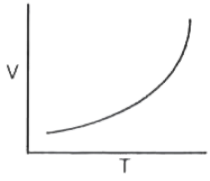
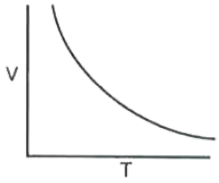
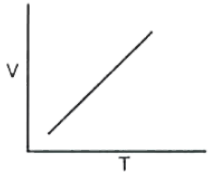
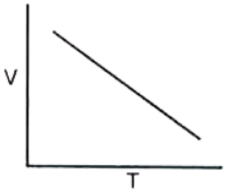
13. A graph showing the variation of volume with temperture at constant pressure would look like

A. 

B. 

C. 

D. 

Answer: C

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14. Molar mas sof an ideal gas can be calculated from the relation.

A. $M = \frac{pd}{RT}$

B. $M = \frac{dRT}{p}$

C. $M = \frac{RT}{pd}$

D. $M = \frac{dRT}{pV}$

Answer: B

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15. For a given sample of ideal gas

A. $V \propto \frac{T}{p}$

B. $V \propto pT$

C. $V \propto \frac{p}{T}$

D. $V \propto \frac{T}{p}$

Answer: D

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16. Which of the following expression represents correctly the variation of density of an ideal gas with change in temperature ?

A. $d_2 = \frac{p_2 T_1 d_1}{p_1 T_2}$

B. $d_2 = \frac{d_1 T_1}{T_2}$

C. $d_2 = \frac{d_1 T_2}{T_1}$

D. $d_2 = \frac{p_1 p_2 T_2}{p_1 T_1}$

Answer: A

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17. Rate of effusion of a gas is :

A. 1. directly proportional to its density

B. 2. directly proportional to its molar mass

C. 3. directly proportional to square root of its molar mass

D. 4. inversely proportional to the square root of its molar mass

Answer: D

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18. The ratio of partial pressure of a gaseous component to the total vapour pressure of the mixture is equal to :

A. mass of the component

B. mole fraction of the component

C. mass % of the component

D. molecular mass of the component.

Answer: B

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19. Which of the following gases will have highest rate of diffusion ?

A. NH_3

B. N_2

C. CO_2

D. O_2

Answer: A

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

A. 1. 100.0366

B. 2. 99.9634

C. 3. 103.66

D. 4. 100.366

Answer: C

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21. Hydrogen diffuses six times faster than the gas A.

The molar mass of gas A is

A. 36

B. 6

C. 24

D. 72

Answer: D

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22. Ten grams of a gas occupies 2 L at STP. At what temperature will the volume of the same quantity of a gas becomes double at the same pressure ?

A. 273K

B. $-273^\circ C$

C. 546K

D. $546^\circ C$

Answer: C

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23. A gas at $10^{\circ}C$ occupies a volume of 283ml. If it is heated to $20^{\circ}C$ keeping the pressure constant, the new volume will be

A. 293 ml

B. 283ml

C. 566ml

D. 586ml

Answer: A

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24. A litre of gas is measured at $27^{\circ} C$. What volume will it occupy at $-23^{\circ} C$?

A. 1200ml

B. 1800 ml

C. 833ml

D. 167ml

Answer: C

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25. 56g of N_2 (molar mass = 28) are mixed with 44g of CO_2 (molar mass = 44) and the pressure of the resulting gaseous mixture is 3 atm. The partial pressure of N_2 in the mixture is :

A. i. 1 atm

B. ii. 1.5 atm

C. iii. 2 atm

D. iv. 3 atm

Answer: C

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26. If 1000 ml of a gas A at 600 torr and 500 ml of gas B at 800 torr are placed in a 2L flask, the final pressure will be

A. 500 torr

B. 1000 torr

C. 850 torr

D. 200 torr

Answer: A

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27. 160 ml of a gas are collected over water at $25^\circ C$ and 768.8mm Hg. If aqueous tension at $25^\circ C$ is 23.8 mm Hg, then pressure of dry gas at $25^\circ C$ is $1:29PM$

A. 76.8mm Hg

B. 760 mm Hg

C. 721.2mm Hg

D. 600 mm Hg

Answer: C

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28. An unknown gas 'X' diffuses four times as quickly as oxygen. The molar mass of the unknown gas is :

A. 2

B. 64

C. 4

D. 32

Answer: A

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29. The temperature of a certain mass of a gas is increased from 50 to $51^\circ C$ at same pressure . The volume of the gas

A. remains same

B. will increase by $1/273$th of its volume at 273K

C. will increase by $1/273K$ of its volume at $50^\circ C$

D. will increase by an amount $\frac{50}{51} \times \frac{1}{273}$

Answer: B

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30. The volume occupied by 0.25 mol of an ideal gas at S.T.P. is :

A. 89.6L

B. 11.2L

C. 5.6L

D. 22.4L

Answer: C

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31. The molar volume of ethane (C_2H_6) at $819^\circ C$ and 760 mm of pressure is :

A. 22.4L

B. 5.6L

C. 89.6L

D. 44.8L

Answer: C

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32. What volume of 0.25mol of oxygen occupy at 8.2atm pressure and $127^{\circ}C$ according to ideal gas law ?

A. 1L

B. 1.5L

C. 0.1L

D. 4.5L

Answer: A

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

A. 1. $3.0gL^{-1}$

B. 2. $30gL^{-1}$

C. 3. $1.34gL^{-1}$

D. 4. $2.68gL^{-1}$

Answer: C

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34. 0.6 L of an ideal gas weighs 1.80 g at $27^{\circ}C$ and 1 atm pressure. Its approximate molar mass is :

A. 36.9

B. 72.0

C. 147.6

D. 369

Answer: B

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35. 2.8 g of N_2 , 0.40 g of H_2 and 6.4g of O_2 are placed in a container of 1.0 L capacity at $27^\circ C$. The total pressure in the container is :

A. 6.12 atm

B. 12.3 atm

C. 1.23atm

D. 24.6 atm

Answer: B

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36. Under constant presure, a certain gas at $0^\circ C$ was cooled until its volume as reduced to one-half. The temperature at this stage is :

A. 0 K

B. $-136.5K$

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

D. $-136.5^{\circ}C$

Answer: D

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37. The relative rate of diffusion of a gas (molar mass = 128) as compared to oxygen is :

A. 2 times

B. $1/4$ th

C. $1/8th$

D. $1/2$

Answer: D

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38. The dencity of the neon will be highest at

A. S.T.P.

B. $0^\circ C$ and 2 atm

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

D. 273° C and 1 atm

Answer: B

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39. A gas diffuses $1/5$ times as fas as hydrogen. Its molar mass is :

A. 25

B. 50

C. $25\sqrt{2}$

D. $50\sqrt{2}$

Answer: B

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40. The pressure of 2 moles of an ideal gas at $273^{\circ}C$ occupying a volume of 44.8L is :

A. 2 atm

B. 1 atm

C. 3 atm

D. 4 atm

Answer: A

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41. 3.2 g of oxygen and 0.2 g of hydrogen are placed in a 1.12 L flask at $0^{\circ}C$. The total pressure of the gas mixture will be

A. 1 atm

B. 4 atm

C. 3 atm

D. 2 atm

Answer: B

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42. At what temperature in the celsius scale, V (volume) of a certain mass of gas at $27^\circ C$ will be doubled keeping the pressure constant ?

A. $54^\circ C$

B. $327^\circ C$

C. $427^\circ C$

D. 527°

Answer: B

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43. At constant temperature , if pressure increases by 1% , the percentage decrease of volume is :

A. 1%

B. $100/101\%$

C. $1/101\%$

D. $1/100\%$

Answer: C

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44. 50 ml of hydrogen diffuses through a small hole from a vessel in 20 minutes. Time taken for 40 ml of oxygen to diffuse under similar conditions will be

A. 12 min.

B. 64 min.

C. 8 min

D. 32 min.

Answer: B

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45. Vapour densities of O_2 and CH_4 are 32 and 16 respectivley. The ratio of rate of diffusion of CH_4 to that of O_2 is

A. $\sqrt{2}:1$

B. $1:\sqrt{2}$

C. $2:1$

D. $1:2$

Answer: A

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46. According to Graham's law at a given temperature the ratio of the rates of diffusion r_A / r_B of gases A and B is given by

A. $(P_A / P_B)(M_A / M_B)^{1/2}$

B. $(M_A / M_B)(P_A / P_B)^{1/2}$

C. $(P_A / P_B)(M_B / M_A)^{1/2}$

D. $(M_A / M_B)(P_B / P_A)^{1/2}$

Answer: C

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47. The density of a gas at $27^\circ C$ and 1 atm pressure is d. Pressure remaining constant at which of the following temperature will its density be 0.75 d ?

A. $20^\circ C$

B. $30^\circ C$

C. $400K$

D. $300K$

Answer: B

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48. x ml of H_2 gas effuses through a hole in a container in 5 seconds. The time taken for the effusion of the same volume of the gas specified below under identical conditions is

A. 10 seconds : HE

B. 20 seconds : O_2

C. 25 seconds : CO

D. 55 seconds : CO_2

Answer: B

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49. Under identical conditons which of the following pair will be most easy to separate by diffusion process ?

A. $^{235}UF_6$ and $^{238}UF_6$

B. H_2 and D_2

C. CO_2 and C_3H_8

D. O_2 and N_2

Answer: B

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50. The mass of $2.24 \times 10^{-3} m^3$ of a gas is 4.4 g at 273.15 K and 101.325 kPa pressure. The gas may be

A. NO

B. NO_2

C. C_3H_8

D. NH_3

Answer: C

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51. Which of the following postulates of kinetic molecular theory of gases is not correct ?

A. Molecular collisions are perfectly elastic.

B. There are no forces of attraction or repulsion between molecules.

C. The molecules are in a state of rapid motion in all directions.

D. The average kinetic energy of the gas molecules is inversely proportional to the absolute temperature.

Answer: D

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52. For one mole of a gas, the total kinetic energy is equal to :

A. RT

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

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

D. $\frac{3}{2}\frac{RT}{N_0}$

Answer: B

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53. The ratio of r.m.s. velocity and average velocity of a gas molecule at a particular temperature is :

A. $1.086:1$

B. $1:1.086$

C. $2:1.086$

D. $1.086:2$

Answer: A

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54. Which of the following molecules will have the highest r.m.s. velocity at $27^\circ C$?

A. H_2

B. O_2

C. CH_4

D. NO_2

Answer: A

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55. If E_k is the average kinetic energy per mole of a gas, then :

A. $pV = \frac{3}{2}E_k$

B. $P = \frac{3}{2}V.\ E_k$

C. $pV = \frac{2}{3}E_k$

D. $3pV = E_k$

Answer: C

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56. Which of the following gas molecules has the lowest average speed at $0^\circ C$?

A. CH_4

B. CO_2

C. C_2H_6

D. CO

Answer: B

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57. At absolute zero temperature, the total kinetic energy of the molecules is :

A. maximum

B. minimum

C. zero

D. cannot be predicted

Answer: C

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58. Two flasks A and B of 1L each are filled with O_2 and SO_2 gas at 27°C and 1 atm pressure. The flasks will contain .

A. same number of atoms

B. same number of moles

C. more number of moles in flask B as compared to flask A

D. same amount of gases in gram

Answer: B

59. Helium atom is two times heavier than a hydrogen molecule. At $25^{\circ}C$, the average kinetic energy of a helium atom is :

A. two times that of a hydrogen molecule

B. same as that of a hydrogen molecule

C. four times that of a hydrogen molecule

D. half that of a hydrogen molecule

Answer: B

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60. The kinetic gas equation for 'N' number of molecues in volume V having mass m and root mean square velocity μ is :

A. $pV = \frac{1}{3}mN\mu^2$

B. $pV = \frac{3}{2}mN\mu^2$

C. $pV = \frac{2}{3}mN\mu^2$

D. $\frac{3}{2}pV = mN\mu^2$

Answer: A

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

A. 1. increase in average molecular speed

B. 2. increased rate of collision amongst molecules

C. 3. increase in molecular attraction

D. 4. decrease in mean free path

Answer: A

62. Accroding to the kinetic theory of gases, for a diatomic molecule

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

B. the pressure exerted by the gas is proportional to the root mean square velocity of the

molecules

C. the root mean square velocity of the molecules is inversely proportional to the temperature

D. the mean translational kinetic energy of the molecules is proportioanl to the absolute temperature

Answer: D

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

A. pressure of the gas

B. nature of the gas

C. volume of the gas

D. absolute temperatue of the gas

Answer: B

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64. If a gas expands at constant temperature.

A. the pressure increases

B. the kinetic energy of the molecues remains same.

C. the kinetic energy of the molecules decreases

D. the kinetic energy of the molecules of the gas increases

Answer: B

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65. At the same temperature and pressure, which of the following gases will have highest kinetic energy per mole ?

A. hydrogen

B. oxygen

C. methane

D. all have same.

Answer: D

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66. The root mean square velocity of an ideal gas in a closed container of a fixed volume is increased from $5 \times 10^4 cms^{-1}$ to 10×10^4 cm s^{-1}. Which of the

following statements might correctly explain how the change is accomplished ?

A. By heating the gas, the temperature is doubled

B. By heating the gas, the pressure is quadrupled (i.e. made four times)

C. By heating the gas, the volume is tripled.

D. By heating the gas, the pressure is doubled.

Answer: B

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67. With increase in temperature, the difference between r.m.s. velociyt and average velocity will

A. increase

B. decrease

C. remain same

D. decrease becoming almost zero at high temperature.

Answer: A

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68. The total kinetic energy of 2 mol of an ideal gas at $127^{\circ}C$ is (Use R = 8.3 $JK^{-1}mol^{-1}$)

A. 9.96 kJ

B. 19.92kJ

C. 3.32kJ

D. 39.84kJ

Answer: A

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69. At what temperature will the RMS velocity of SO_2 be the same as that of O_2 at 303 K?

A. $327^\circ C$

B. $127^\circ C$

C. $54^\circ C$

D. $227^\circ C$

Answer: A

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70. At a given temperature, oxygen molecules will have the speed that is, in comparison to speed of hydrogen molecules

A. the same

B. four times

C. one-fourth

D. one-sixteenth.

Answer: C

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71. The temperature at which the r.m.s. velocity of gas molecules is doubled than that at $27^\circ C$ is :

A. 108°

B. $927^\circ C$

C. $327^\circ C$

D. $54^\circ C$

Answer: B

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72. The average velocity of an ideal gas at $27^\circ C$ is 0.3m $\sec^{-1}$. The average velocity at $927^\circ C$ will be

A. 0.6 m $\sec^{-1}$

B. $0.3m \sec^{-1}$

C. $0.9m \sec^{-1}$

D. 1.2 m $\sec^{-1}$

Answer: A

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73. The total kinetic energy of a sample of gas which contians N molecules at $-123^{\circ}C$ has E_K joules. Another sample of gas at $27^{\circ}C$ has totla kinetic energy of 2 E_K joules. The number of molecules in the second sample of gas is :

A. $N/2$

B. $2N$

C. N

D. N^2

Answer: C

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74. The numerical value of N/n (where N is the number of molecules in a given sample of gas and n is the number of moles of the gas) is :

A. 8.314

B. 6.02×10^{23}

C. 0.0821

D. 1.66×10^{-19}

Answer: B

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75. A gas container observes Maxwell distribution of speeds. If the number of molecules between the speed 5 and 5.1 km $\sec^{-1}$ at $25^{\circ}C$ be 'n', what would be the number of molecules between this range of speed if the total number of molecules in the vessel are doubled ?

A. n^2

B. nature of the gas

C. $n/2$

D. 2n

Answer: D

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76. The temperature at which hydrogen molecules will have the same root mean square velocity as oxygen molecules have at $127^\circ C$ is :

A. 1. $25^\circ C$

B. 2. $7.93^\circ C$

C. 3. $-248^\circ C$

D. 4. $127^\circ C$

Answer: C

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77. The average kinetic energy of the molecules of SO_2 at $27^\circ C$ is E. The average kinetic energy of CO_2 at $27^\circ C$ is :

A. $16E/11$

B. $11E/16$

C. 2E

D. E

Answer: C

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78. Two flasks of equal volume contain SO_2 and CO_2 respectively at $25^\circ C$ and 2 atm pressure. Which of the following is equal in them ?

A. masses of the two gases

B. number of molecules

C. rates of effusion

D. molecular structure.

Answer: B

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79. Two flasks A and B having capacity 1L and 2L respecitvely contain one mole of a gas each. If the temperatrue of the flasks are so adjusted that the average velocity of molecules in A is twice that of molecules in B, the pressure of A is :

A. half that in B

B. same as that in B

C. four times that in B

D. eight times that in B.

Answer: D

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80. The root mean square speed of oxygen at $27^{\circ} C$ is $760 cm s^{-1}$. The root mean square speed of hydrogen at the same temperature will be :

A. 3040 cm s^{-1}

B. 190 cm s^{-1}

C. $1520 cm s^{-1}$

D. 760 cm s^{-1}

Answer: A

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81. At $27^\circ C$, the ratio of r.m.s. velocities of ozone and oxygen is :

A. $\sqrt{3/5}$

B. $\sqrt{4/3}$

C. $\sqrt{2/3}$

D. 0.25

Answer: C

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82. The molecular velocities of two gases at same temperature are u_1 and u_2 and their masses are m_1

and m_2 respectively. Which of the following expressions is correct ?

A. $\frac{m_1}{u_1^2} = \frac{m_2}{u_2^2}$

B. $m_1 u_1 = m_2 u_2$

C. $\frac{m_1}{u_1^2} = \frac{m_2}{u_2^2}$

D. $m_1 u_1^2 = m_2 u_2^2$

Answer: D

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83. Oxygen and hydrogen are at same temperature . The kinetic energy of oxygen molecules will be

A. 16 times

B. 4 times

C. equal to k.E of hydrogen

D. $1/4$the of the K.E. of hydrogen molecules

Answer: C

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

A. 4

B. 2

C. 1

D. $1/4$

Answer: C

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85. The temperature of an ideal gas is increased from 140K to 560K. If at 140K, the root mean square velocity of the gas is x, at 560K it becomes

A. 5x

B. 4x

C. 2x

D. $x/2$

Answer: C

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86. Which of the following expressions correctly represents the relationship between the average molar kinetic energy $\overline{KE}$ of CO and N_2 molecules at the same temperature ?

A. $\overline{\overline{KE}}(CO) = \overline{\overline{KE}}(N_2)$

B. $\overline{\overline{KE}}(CO) > \overline{\overline{KE}}(N_2)$

C. $\overline{KE}(CO) < \overline{KE}(N_2)$

D. cannot be predicted unless that volume of the gases are given.

Answer: A

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87. The r.m.s. velocity of molecules of a gas of density 4kg $/m^3$ and pressure $1.2 \times 10^5 N/m^2$ is

A. 900 m/s

B. $120 m/s$

C. $600m/s$

D. $300m/s$

Answer: D

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88. Which of the following comparisons of the average kinetic energy and the average molecular speeds of H_2 and N_2 gases at 300K is correct ?

A. $\begin{matrix} \text{Average K.E.} & \text{Average molecular speed} \\ H_2 = N_2 & H_2 = N_2 \end{matrix}$

B. $\begin{matrix} \text{Average K.E.} & \text{Average molecular speed} \\ H_2 < N_2 & H_2 > N_2 \end{matrix}$

C. $\begin{matrix} \text{Average K.E.} & \text{Average molecular speed} \\ H_2 = N_2 & H_2 < N_2 \end{matrix}$

D. $\begin{array}{ll} \text{Average K.E.} & \text{Average molecular speed} \\ H_2 = N_2 & H_2 > N_2 \end{array}$

Answer: D

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89. Gases deviate from ideal behaviour at high pressure because at high pressure :

A. 1. size of the molecules become considerably large

B. 2. molecules become stationary

C. 3. rate of molecular collisions become enormous

D. 4. intermolecular forces become enormous.

Answer: D

Watch Video Solution

90. Give the expression for

Van der Waal's equation for n moles of a gas

A. $\left(P+\frac{an^2}{V^2}\right)(nV-b)=nRT$

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

C. $\left(P - \frac{an^2}{V^2}\right)(V - nb) = nRT$

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

Answer: D

Watch Video Solution

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

A. Critical temperature

B. Reduced temperature

C. Boyle's temperature

D. Inversion temperature

Answer: C

Watch Video Solution

92. In van der Waals equation, the constant of accounts for what property of molecules of real gases ?

A. 1. Average kinetic energy

B. 2. Size of molecules

C. 3. Intermolecular attractions

D. 4. Elastic collisions.

Answer: C

Watch Video Solution

93. The constant 'a' in van der Waals' equation is maximum in

A. Hydrogen

B. Helium

C. Oxygen

D. Ammonia

Answer: D

Watch Video Solution

94. The critical temperature of a gas is the temperature

A. below which it cannot be liquified

B. at which one mole of it occupies 22.4L

C. at which it can be changed directly to solid

D. above which it cannot be liquified by pressure

Answer: D

Watch Video Solution

95. What are the units of Vanderwaals constants a' and b' ?

A. atm $L^2 mol^{-2}$

B. atm $L^{-2} mol^{-2}$

C. atm L mol^{-1}

D. atm $molL^{-1}$

Answer: A

Watch Video Solution

96. In van der Waals equation for a non ideal gas, the term that account for intermolecular forces is :

A. $(V - b)$

B. RT

C. $\left(p + \frac{a}{V^2}\right)$

D. $(RT)^{1/2}$

Answer: C

Watch Video Solution

97. Gases deviate from ideal behaviour at high pressures. Which of the following is correct for non-ideality at high pressure :

A. 1. the collisions between the molecules becomes enormous

B. 2. the gas molecules move only in one direction

C. 3. the volume of the gas becomes insignificant

D. 4. intermolecular interactions become significant

Answer: D

Watch Video Solution

98. A real gas obeying van der Waals' equation : $\left(P+\frac{an^2}{V^2}\right)(V-b)=nRT$ will closely resemble

an ideal gas if

A. the constants a and b are large

B. a is large and b is amll

C. a is small and b is large

D. a and b are both small.

Answer: D

Watch Video Solution

99. The values of van der Waals' constant 'a' for the gases O_2. N_2, NH_3 and CH_4 are 1.360, 1.390 , 4.170

and 2.52 L^2 atm mol^{-2} respectively . The gas which can most easily be liquified is :

A. O_2

B. N_2

C. NH_3

D. CH_4

Answer: C

Watch Video Solution

100. A real gas tends to behave more ideally at

A. low temperature and low pressure

B. low temperature and high pressure

C. high temperature and low pressure

D. high temperature and high pressure.

Answer: C

Watch Video Solution

101. A given gas cannot be liquefied if its temperature is

A. less than its critical temperature

B. greater than its critical temperature

C. equal to its critical temperature

D. equal to its inversion temperature

Answer: C

Watch Video Solution

102. Which of the following relation is correct for critical constants

A. $P_c = \frac{a}{27b^2}$

B. $V_c = \frac{1}{3}b$

C. $T_c = \frac{8a}{27Rb^2}$

D. $p_c = \frac{27a}{Rb^2}$

Answer: A

Watch Video Solution

103. The van der Waals equation reduces itself to the ideal gas equatio nat

A. high pressure and low temperature

B. low pressure and low temperature

C. low pressure and high temperature

D. high pressure and high temperature

Answer: C

Watch Video Solution

104. Critical temperatures of $H_2O. NH_3. CO_2$ and O_2 are 647K , 405K, 304.10 and 154.2 K respecitvely. If the cooling starts from 500K to their critical temperature, the gas that liquifies first is :

A. H_2O

B. NH_3

C. CO_2

D. O_2

Answer: A

Watch Video Solution

105. Which of the following properties of liquids does not decrease with rise in temperature ?

A. 1. Vapour pressure

B. 2. Viscosity

C. 3. Surface tension

D. 4. Density

Answer: A

Watch Video Solution

106. The rise of a liquid in a capillary is due to

A. viscosity

B. diffusion

C. Surface tension

D. osmosis.

Answer: C

Watch Video Solution

107. With rise in temperature , viscosity of a liquid

A. 1. increases

B. 2. decreases

C. 3. remains constant

D. 4. may increase or decrease.

Answer: B

Watch Video Solution

108. When rate of evaporation and condensation become equal in a closed container containing a liquid.

A. Cooling will be caused

B. The amounts of the substance in the liquid and vapour states become equal

C. The amounts of the substance in the liquid and vapour states become constant

D. Some liquid starts solidifying.

Answer: C

Watch Video Solution

109. The internal resistance to flow in liquids which one layer offers to the other layer trying to pass over it is called :

A. Fluidity

B. Specific resistance

C. Viscosity

D. Surface tension.

Answer: D

Watch Video Solution

110. The state of balance between evaporation and condensation of a liquid is called

A. Critical state

B. Sublimation

C. Dynamic equilibrium

D. Crystallisation

Answer: C

Watch Video Solution

Multiple Choice Questions Level Ii

1. Which of the following statements is not correct ?

A. 1. Lighter gases diffuse faster than heavier gases.

B. 2. The volume of a gas always increases when the temperature increases.

C. 3. Molecules of different gases have the same average kinetic energy at given temperature

D. 4. Hydrogen molecules diffuse faster in a vacuum than in air

Answer: B

Watch Video Solution

2. When an ideal gas expands in vacuum, no cooling is observed because the molecules

A. have elastic collisions

B. do work equal to loss in kinetic energy

C. do not have molecular attractions

D. are at rest in vacuum

Answer: C

Watch Video Solution

3. 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 rind first formed will be

A. at the centre of the tube

B. near the hydrogen chloride bottle

C. near the ammonia bottle

D. throughout the length of the tube

Answer: B

 Watch Video Solution

4. The root mean square speed of gas molecules

A. increases with molar mass

B. decreases with temperature

C. increases with temperature

D. increases with temperature as well as molar mass

Answer: C

 Watch Video Solution

5. For H_2 gas, the compressibility factor, $Z = pV/nRT$ is :

A. 1. equal to 1

B. 2. equal to 0

C. 3. always greater than 1

D. 4. initially less than 1 and then becomes greater than 1 at high pressures

Answer: C

Watch Video Solution

6. Which of the following is not heavier than dry air ?

A. SO_2

B. O_2

C. CO_2

D. moist air

Answer: D

Watch Video Solution

7. Which of the following gas laws is applicable to steam distillation ?

A. Charles' law

B. Dalton's law of partial pressures

C. Graham's law of diffusion

D. Boyle's law

Answer: B

 Watch Video Solution

8. Absolute zero is the temperature at which

A. Water freezes completely

B. all substances exist as solids

C. all gases become liquids

D. molecular motion ceases

Answer: D

Watch Video Solution

9. The root mean square speeds at STP for the gases $H_2. N_2. O_2$ and HBr are in the order :

A. $H_2 < N_2 < O_2 < HBr$

B. $HBr < O_2 < N_2 < H_2$

C. $H_2 < N_2 = O_2 < HBr$

D. $HBr < O_2 < H_2 < N_2$

Answer: B

Watch Video Solution

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

A. 1. Carbon dioxide and nitrous oxide

B. 2. Carbon dioxide and nitrogen peroxide

C. 3. Carbon dioxide and carbon monoxide

D. 4. Carbon dioxide and nitric oxide

Answer: A

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

A. are above the inversion temperature

B. exert no attractive forces on each other

C. do work equal to the loss in kinetic energy

D. collide without loss of energy

Answer: B

Watch Video Solution

12. A gas occupies a volume of 250 ml at 700 mm Hg pressure and $25^{\circ}C$. What additional pressure is required to reduces the gas volume to its $4/5$ th value at the same temperature ?

A. 225 mm Hg

B. 175 mm Hg

C. 150 mm Hg

D. 265 mm Hg

Answer: B

Watch Video Solution

13. Two sample of gases A and B are at the same temperature. The molecules of A are travelling 4 times faster than molecules of B. The ratio M_A / M_B of their masses will be

A. 16

B. $1/16$

C. 4

D. $\frac{11}{4}$

Answer: B

Watch Video Solution

14. The molar volume of methane , CH_4. At $819^\circ C$ and 760mm pressure is :

A. 22.4L

B. 44.8L

C. 89.6L

D. 5.6L

Answer: C

Watch Video Solution

15. A vessel is filled with a mixture of oxygen and nitrogen . At what ratio of partial pressure will the mass of gases be identical ?

A. $p(O_2) = 0.5p(N_2)$

B. $p(O_2) = p(N_2)$

C. $p(O_2) = 1.14p(N_2)$

D. $p(O_2) = 0.875p(N_2)$

Answer: D

Watch Video Solution

16. The relative rates of diffusion of sulphur dioxide (molar mass = 64) and helium (at. Mass = 4) at the same temperature and pressure are :

A. $16:1$

B. $1:4$

C. $8:1$

D. $1:8$

Answer: B

Watch Video Solution

17. The number of molecules of an ideal gas in a 4.1 L container at 760 torr and $27^{\circ} C$ will be

A. 6.02×10^{23}

B. 1.0×10^{23}

C. 1.204×10^{24}

D. 1.204×10^{23}

Answer: B

Watch Video Solution

18. What volume of air will be expelled from a vessel containing 600 ml at $27^\circ C$ when it is heated to $37^\circ C$ at the same pressure ?

A. 0.0333

B. 0.02

C. 0.067

D. 0.66

Answer: A

Watch Video Solution

19. When we heat a gas sample from 27°C to 327°C. then the initial average kinetic energy, of the molecules was E. What will be the average kinetic energy after heating ?

A. Doubled

B. Halved

C. Multiplied by the factor 327 / 27

D. Raised to the power two .

Answer: A

Watch Video Solution

20. The volume of a gas measured at $27^\circ C$ and 1 atm pressure is 10L. What final temperature would be required to reduce the volume to 5.0 L at 1 atm pressure ?

A. 450K

B. 327K

C. 150K

D. $100^\circ C$

Answer: C

Watch Video Solution

21. A box is divided into two equal compartments by a thin partition and they are filled with gases P and Q respectively . The two compartments have a pressure of 250 torr each. The pressure after removing the partition will be equal to

A. 500 torr

B. 125 torr

C. 250 torr

D. 5000 torr.

Answer: C

Watch Video Solution

22. A cylinder with movable piston is fitted with H_2 gas at $27^\circ C$ that occupies 250ml. If the maximum capacity of the cylinder is 1L, the highest temperature to which the cylinder can be heated at constant pressure without having the piston to come out is :

A. $1200^\circ C$

B. $977^\circ C$

C. $927^\circ C$

D. $1023K$

Answer: C

Watch Video Solution

23. The root mean square velocity of SO_2 gas becomes the same as that of methane at $27^\circ C$ when the temperature is :

A. $327^\circ C$

B. $127^\circ C$

C. $54^\circ C$

D. $927^\circ C$

Answer: D

Watch Video Solution

24. The number of molecules of an ideal gas in a 8.2 L container at 380 torr and $27^\circ C$ will be

A. 6.02×10^{23}

B. 1.0×10^{22}

C. 1.0×10^{23}

D. 1.204×10^{24}

Answer: C

Watch Video Solution

25. A 10L flask at 300K contains a gaseous mixture of CO and CO_2 at a total pressure of 2.0 atm. If 0.2 mol

of CO is present, the partial pressure of CO_2 is (Use R = 0.082 atm $mol^{-1}K^{-1}$)

A. 0.49 atm

B. 1.49 atm

C. 1.51 atm

D. 2.49 atm

Answer: C

Watch Video Solution

26. What is the molar mass of a gas whose density is $1.5gL^{-1}$ at $27^{\circ}C$ and 1 atm pressure ? (Use R = 0.08L

atm $mol^{-1}K^{-1}$)

A. 360

B. 720

C. 36

D. 18

Answer: C

Watch Video Solution

27. A 8.2 L cylinder of nitrogen gas at 5.0 atm pressure and $27^{\circ}C$ developed a leakage. When the leakage was repaired , 3.5 atm of nitrogen remained

in the cylinder still at that temperature . How many moles of gas escaped ?

A. 0.75 mol

B. 1.0 mol

C. 0.50 mol

D. 1.5 mol

Answer: C

Watch Video Solution

28. Two separate bulbs contain ideal gases A and B respectively. The density of gas A is twice that of gas

B and the molar mass of gas A is half that of gas. If the two gases are at the same temperature, the ratio of pressure of A to that of B is :

A. 1. 4

B. 2. 2

C. 3. $1/4$

D. 4. $1/2$

Answer: A

Watch Video Solution

29. Equal weights of methane and hydrogen are mixeed in an empty container at $25^{\circ}C$. The fraction of total pressure exerted by hydrogen is :

A. $1/8$

B. $8/9$

C. $1/9$

D. $16/17$

Answer: B

Watch Video Solution

30. If 4g of O_2 diffuse through a very narrow hole, how much H_2 would have diffused under identical conditions ?

A. 1g

B. $1/4g$

C. $16g$

D. 64g

Answer: C

Watch Video Solution

31. In the same time required for 5 litres of carbon monoxide to diffuse through a porous barrier, only 2 litres of an unknown gas will pass through . The molecular mass of unknown gas is :

A. 70

B. 11.2

C. 175

D. 4.48

Answer: C

Watch Video Solution

32. A weather balloon filled with hydrogen gas at 1 atm and $27^{\circ}C$ has volume equal to 12000 litres. On ascending , it reaches a place where temperature is $-23^{\circ}C$ and pressure 0.5 atm. The volume of the balloon is :

A. 24000L

B. 12000L

C. 10000L

D. 20000L

Answer: D

Watch Video Solution

33. The mean free path of a gas at 1 atm pressure is l.

Its mean free path at 5 atm pressure will be

A. 5l

B. $l/5$

C. 25l

D. 0.04l

Answer: B

Watch Video Solution

34. When the pressure and absolute temperature of 5L nitrogen are doubled, the gas would have a volume of :

A. 10L

B. 5L

C. 15L

D. 20L

Answer: B

Watch Video Solution

35. A flask containing air (open to atmosphere) is heated from 300K to 500K . The fraction of air escaped to the atmosphere is about.

A. 0.166

B. 0.4

C. 0.66

D. 0.33

Answer: C

Watch Video Solution

36. 4.0g of argon (at. Mass = 40) in a bulb at a temperature of T K has a pressure P atm. When the bulb was placed in a hotter bath at a temperature $50^{\circ}C$ more than the first one, 0.8g of gas had to be removed to get the original temperature T which is equal to

A. 510K

B. 200K

C. 100K

D. 73 K

Answer: B

Watch Video Solution

37. 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. $106.4ms^{-1}$

B. $425.6ms^{-1}$

C. $212.8ms^{-1}$

D. $851.2ms^{-1}$

Answer: C

Watch Video Solution

38. The heat capacity at constant volume of an ideal gas consisting of monatomic molecules is $3/2$ R (where R is the gas constant) . The heat capacity at constant pressure is :

A. R

B. $\frac{5}{2}R$

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

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

Answer: B

Watch Video Solution

39. Two glass bulbs A and B are connected by a very small tube having a stop cock. Bulb A has a volume of 100 ml and contained the gas while bulb B was empty. On opening the stop cock, the pressure fell down to 40%. The volume of the bulb B must be

A. 40 ml

B. 60 ml

C. 150ml

D. 260 ml

Answer: C

Watch Video Solution

40. In what ratio by mass carbon monoxide and nitrgoen gas should be mixed so that partial pressure exerted by each gas is same ?

A. $1:1$

B. $1:2$

C. $2:1$

D. $3:4$

Answer: A

Watch Video Solution

41. From a porous vessel containing equimolar proportions of hydrogen and oxygen, the composition by mass of the mixture effusing out is : hydrogen and oxygen in the ration of

A. $1:4$

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

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

D. $4:1$

Answer: D

Watch Video Solution

42. A balloon weighing 50 kg is filled with 685.2 kg of helium at 1 atm pressure and $25^{\circ}C$. What will be its pay load if it displaced 5108 kg of air ?

A. 4372.8kg

B. 4422.8kg

C. 5793.2kg

D. 5843.2kg

Answer: A

Watch Video Solution

43. An electronic vacuum tube was sealed off during an experiment at a pressure of 8.2×10^{-10} atm at $27^{\circ}C$. The volume of the tube was $30dm^3$. The number of gas molecules remaining in the tube are :

A. 6.023×10^{14}

B. $8.2 \times 6.02 \times 10^{23}$

C. 24.6×10^{6}

D. $8.2 \times 30 \times 6.02 \times 10^{23}$

Answer: A

Watch Video Solution

44. If the root mean square speed of helium is $4.75ms^{-1}$ at $25^{\circ}C$, then its speed will become 9.50 ms^{-1} at

A. $100^{\circ}C$

B. $323^{\circ}C$

C. $919^{\circ}C$

D. $1192^{\circ}C$

Answer: C

Watch Video Solution

45. A 10L cylinder of nitrogen at 4.0 atm pressure and $27^{\circ}C$ develped a leakage. When the leakage was repaired 2.36 atm of nitrogen remained in the cylinder still at $27^{\circ}0C$. How many grams of nitrogen escaped ?

A. 18.7 g

B. 0.67g

C. 52.6g

D. 10.0g

Answer: A

Watch Video Solution

46. The density of methane at 2.0 atm pressure at $27^{\circ}C$ is :

A. $0.13gL^{-1}$

B. $0.26gL^{-1}$

C. $1.30gL^{-1}$

D. $26.0gL^{-1}$

Answer: C

Watch Video Solution

47. The ratio of $\gamma = (C_p / C_v)$ for inert gases is :

A. 1.33

B. 1.66

C. 2.13

D. 1.99

Answer: B

Watch Video Solution

48. The ratio of the rates of diffusion of SO_2, $O_2$and CH_4 is :

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

B. $1:2:4$

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

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

Answer: A

Watch Video Solution

49. A balloon filled with ethane is pricked with a sharp point and quickly plunged into a tank of hydrogen at the same pressure . After some time, the balloon wil

A. be enlarged

B. collapse

C. remain unchanged in size

D. have $1/15$ its volume of the gas.

Answer: A

Watch Video Solution

50. An open vessel at $37^\circ C$ is heated until $3/5$ of the air in it has been expelled. Assuming that the volume of the vessel remains constant, the temperature to which the vessel is heated is

A. $502^\circ C$

B. $502K$

C. $243.67^\circ C$

D. $92.5^\circ C$

Answer: A

Watch Video Solution

51. Cyclopropane and oxygen at partial pressure of 170 and 570 torr respectively are mixed in a gas cylinder . The ratio of the number of moles of cyclopropane to the number of moles of oxygen is

A. 0.190

B. 0.23

C. 0.30

D. 0.39

Answer: C

Watch Video Solution

52. At S.T.P. 0.50 mol of H_2 gas and 1.-0 mol of He gas

A. have equal kinetic energies

B. have equal molecular speeds

C. occupy equal volumes

D. have equal effusion rates.

Answer: A

53. Equal weights of two gases of molecular mass 4 and 40 are mixed. The pressure of the mixture is 1.1 atm. The partial pressure of the lighter gas in this mixture is

A. 0.55 atm

B. 0.11 atm

C. 1.0 atm

D. 0.1 atm

Answer: C

Watch Video Solution

54. A bottle of cold drink contains 200ml liquid in which CO_2 is 0.1 molar. Suppose CO_2 behaves like an ideal gas, the volume of dissolved CO_2 at S.T.P. is

A. 0.224L

B. 0.448L

C. 22.4L

D. 2.24L

Answer: B

Watch Video Solution

55. If 0.2g of a gas 'X' occupies a volume of 440 ml and if 0.1 g of CO_2 gas occupies a volume of 320 ml at the same temperature and pressure , X could be

A. O_2

B. NO

C. C_4H_{10}

D. SO_2

Answer: D

Watch Video Solution

56. In what ratio by mass, sulphur trioxide and nitrogen should be mixed so that the partial pressure exerted by each gas is same ?

A. $7:20$

B. 7 : 40

C. 20 : 7

D. 40 : 7

Answer: C

Watch Video Solution

57. When the temperature of an ideal gas is increased from $27^\circ C$ to $927^\circ C$, the kinetic energy will be

A. same

B. eight times

C. four times

D. twice

Answer: C

Watch Video Solution

58. The volume of NH_3 obtained by the combination of 10mL of N_2 and 30 mL of H_2 is

A. 20 mL

B. 40 mL

C. 30 Ml

D. 10 mL

Answer: A

Watch Video Solution

59. A what temperature, the rate of effusion of N_2 would be 1.625 times that of SO_2 at $50^\circ C$?

A. 135K

B. 373K

C. 546 K

D. 303K

Answer: B

Watch Video Solution

60. The average velocity of gas molecules is 400 ms^{-1} . Its r.m.s. velocity at the same temperature is

A. $2.62ms^{-1}$

B. $1.68ms^{-1}$

C. $5.86ms^{-1}$

D. $4.34ms^{-1}$

Answer: D

Watch Video Solution

61. The surface tension of which of the following liquid is maximum ?

A. C_2H_5OH

B. CH_3OH

C. H_2O

D. C_6H_6

Answer: C

Watch Video Solution

62. The units of constant 'a' in van der Waals equation is :

A. dm^6 atm mol^{-2}

B. dm^3 atm mol^{-1}

C. dm atm. mol^{-1}

D. atm mol^{-1}

Answer: A

Watch Video Solution

63. The van der Waals' constants for four gases P,Q,R and S are 4.17 , 3.59, 6.71 and 3.8 atm L^2mol^{-2} respectively. The ascending order for their liquefication is

A. $R < P < S < Q$

B. $Q < S < R < P$

C. $Q < S < P < R$

D. $R < P < Q < S$

Answer: C

Watch Video Solution

64. 100 mL of O_2 and H_2 are kept at same temperature and pressure. What is true about their number of molecules ?

A. $N_{O_2} > N_{H_2}$

B. $N_{O_2} < N_{H_2}$

C. $N_{O_2} = N_{H_2}$

D. $N_{O_2} + N_{H_2} = 1\text{mole}$

Answer: C

Watch Video Solution

65. 0.5 mol each of H_2, SO_2 and CH_4 are ketp in a container. A hole was made in the container. After 3 hours, the order of partial pressure in the container will be :

A. $pSO_2 > pCH_4 > pH_2$

B. $pH_2 > pSO_2 > pCH_4$

C. $pH_2 > pCH_4 > pSO_2$

D. $pSO_2 > pH_2 > pCH_4$

Answer: A

Watch Video Solution

66. The energy absorbed by each molecule (A_2) of a subtance is $4.4 \times 10^{-19} J$ and bond energy per molecule is 4×10^{-19}J. The kinetic energy of the molecule per atom will be

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

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

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

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

Answer: D

 Watch Video Solution

67. By what factor does the average velocity of a gaseous molecule increase when the absolute temperature is doubled ?

A. 1.4

B. 2.0

C. 2.8

D. 4.0

Answer: A

Watch Video Solution

68. What will happen to the volume of a bubble of air found under water in a lake, where the temperature is $15^{\circ}C$ and the pressure is 1.5 atm. If the bubble then rises to the surface where the temperature is $25^{\circ}C$ and the pressure is 1.0 atm ?

A. Its volume will become greater by a factor of 2.5

B. Its volume will become greater by a factor of 1.6

C. Its volume will become greater by a factor of 1.1

D. Its volume will become greater by a factor of 0.70

Answer: B

Watch Video Solution

69. An evacuated glass vessel weighs 50g when empty, 148.0 g when filled with a liquid of density $0.98gml^{-1}$ and 50.5g when filled with an ideal gas at 760mm Hg at 300K . The molar mass of the ideal gas is (Given R = 0.0821 L atm $K^{-1}mol^{-1}$)

A. 61.575

B. 130.98

C. 123.75

D. 87.943

Answer: A

Watch Video Solution

70. At same temperature and pressure, the rate of diffusion of hydrogen gas is $3\sqrt{3}$ times that of a hydrocarbon having molecular formula, C_nH_{2n-2} .The value of n is

A. 3

B. 2

C. 6

D. 4

Answer: D

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

A. 50.00u

B. 12.25u

C. 6.50u

D. 25.00u

Answer: B

Watch Video Solution

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

A. 0.5 atm

B. 0.8 atm

C. 0.9 atm

D. 1 atm

Answer: A

73. 50mL of each gas A and of gas B takes 150 and 200 seconds respectively for effusing through a pin hole under the similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be :

A. 64

B. 96

C. 128.4

D. 20.2

Answer: D

74. A person living in Shimla observed that cooker takes more time. The reason for this observation is that at high altitude :

A. pressure increases

B. temperature increases

C. pressure decreases

D. temperature increases

Answer: C

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75. Which of the following property of water can be used to explain the spherical shape of rain droplets ?

A. viscosity

B. surface tension

C. critical phenomena

D. pressure

Answer: B

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76. The pressure of a $1:4$ mixture of dihydrogen and dioxygen enclosed in a vessel is one atmosphere. What would be the partial pressure of dioxygen ?

A. 0.8×10^5atm

B. $0.008Nm^{-2}$

C. $8 \times 10^4 Nm^{-2}$

D. 0.25 atm

Answer: C

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77. As the temperature increases, average kinetic energy of molecules increases. What would be the effect of increase of temperature on pressure provided the volume is constant ?

A. increases

B. decreases

C. remains same

D. becomes half

Answer: A

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78. Gases possess characteristic critical temperature which depends upon the magnitude of intermolecular forces between the particles. Following are the critical temperatures of some gases.

Gases	H_2	He	O_2	N_2
Critical temperature in Kelvin	33.2	5.3	154.3	126

From the above data what would be the order of liquefaction of these gases? Start writing the order from the gas liquefying first.

A. H_2, He, O_2, N_2

B. He, O_2, H_2, N_2

C. N_{2,O_2,He,H_2}

D. O_2, N_2, H_2, He

Answer: D

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79. What is SI unit of viscosity coefficient (η) ?

A. Pascal

B. Nsm^{-2}

C. $KM^{-2}S$

D. Nm^{-2}

Answer: B

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80. The ratio of average speed of an oxygen molecular to the r.m.s. speed of a N_2 molecular at the same temperature is :

A. $\left(\frac{3\pi}{7}\right)^{1/2}$

B. $\left(\frac{7}{3\pi}\right)^{1/2}$

C. $\left(\frac{3}{7\pi}\right)^{1/2}$

D. $\left(\frac{7\pi}{3}\right)^{1/2}$

Answer: B

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81. A cylinder of V litre capacity containing NH_3 gas is inverted over another vessel of V litre capacity containing HCl gas at same temperature and pressure . After some time the pressure in cylinder will :

A. 1. become double

B. 2. remain same

C. 3. drop considerably

D. 4. become $3/2$ of original pressure

Answer: C

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82. If r.m.s. speed of gaseous molecules is $xcms^{-1}$ at a pressur eof p atm, their r.m.s. at a pressure of 2 atm and constant temperature will be

A. x

B. 2x

C. 4x

D. $x/4$

Answer: A

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83. The pressure and temperature of $4dm^3$ of carbon dioxide gas are doubled. Then the volume of carbon dioxide gas would be

A. $2dm^3$

B. $3dm^3$

C. $4dm^3$

D. $8dm^3$

Answer: C

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84. Equation for Boyle's law is

A. $\frac{dp}{p} = -\frac{dV}{V}$

B. $\frac{dp}{p} = +\frac{dV}{V}$

C. $\frac{d^2p}{p} = -\frac{dV}{V}$

D. $\frac{d^2p}{p} = +\frac{d^2V}{V}$

Answer: A

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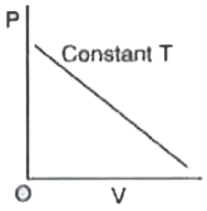
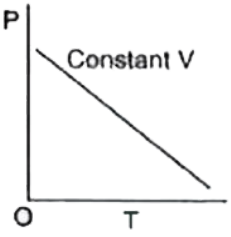
85. Which of the following diagram correctly describes the behaviour of a fixed mass of an ideal gas ? (T is measured in K) .

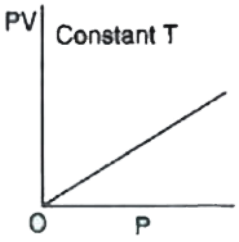
A.



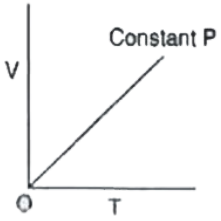
B.



C.



D.



Answer: D

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86. At what temperature, will the rms velocity of a gas at $50^\circ C$ be doubled ?

A. 626K

B. 1019K

C. $200^{\circ} C$

D. $1019^{\circ} C$

Answer: D

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87. The ratio of rates of diffusion of hydrogen chloride and ammonia gases is

A. $1 : 1.46$

B. $1 : 2.92$

C. $1.46:1$

D. $1:0.73$

Answer: A

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

A. 1

B. 4

C. 3

D. 8

Answer: B

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

A. 0.5 atm

B. 0.8 atm

C. 0.9 atm

D. 1 atm

Answer: A

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90. By what factor does the average velocity of a gaseous molecule increase when the absolute temperature is doubled ?

A. 2.0

B. 2.8

C. 4.0

D. 1.1

Answer: D

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91. 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: A

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92. The r.m.s. velocity of hydrogen is $\sqrt{7}$ times the r.m.s. velocity of nitrogen. If T is the temperature of the gas :

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

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

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

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

Answer: A

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93. For an ideal gas, number of moles per litre in terms of its pressure p, gas constant R and temperature T is :

A. pT / R

B. pRT

C. p / RT

D. RT / p

Answer: C

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94. When the temperature is increased, surface tension of water :

A. increases

B. decreases

C. remains constant

D. shows irregular behaviour

Answer: B

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

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

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

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

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

Answer: B

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Multiple Choice Questions Level Iii

1. a' and 'b' are van der Waals' constant for gases. Chlorine is more easily liquefied than ethane because

A. a for $Cl_2 < a$ for C_2H_6 but b for $Cl_2 > b$ for C_2H_6

B. a for $Cl_2 > a$ for C_2H_6 but b for $Cl_2 < b$ for C_2H_6

C. a and b for $Cl_2 > a$ and b for C_2H_6

D. a and b for $Cl_2 < a$ and b for C_2H_6

Answer: B

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

A. $(P_A / P_B)(M_B / M_A)^{1/2}$

B. $(P_A / P_B)^{\frac{1}{2}}(M_B / M_A)$

C. $(P_A / P_B)(M_A / M_B)^{1/2}$

D. $(P_A / P_B)^{\frac{1}{2}}(M_A / M_B)$

Answer: A

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3. The molecular velocity of any gas is :

A. inversely proportional to absolute temperature

B. directly proportional to square of temperature

C. directly proportional to square root of temperature

D. inversely proportional to the square root of temperature.

Answer: C

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

A. $1 - pb/RT$

B. $1 + RT/pb$

C. 1

D. $1 + Pb/RT$

Answer: D

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5. For gaseous state, if most probable speed is denoted by C^*, average speed by $\overline{C}$ and mean square speed by C, then for a large number of molecules the ratios of these speeds are :

A. $C^* : \overline{C} : C = 1.225 : 1.\ 128 : 1$

B. $C^* : \overline{C} : C = 1.128 : 1.225 : 1$

C. $C^* : \overline{C} : C = 1 : 1.128 : 1.225$

D. $C^* : \overline{C} : C = 1 : 1.225 : 1.128$

Answer: C

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6. If Z is the compressibility factor, van der Waals equation at low pressure can be written as

A. $Z = 1 + \frac{RT}{Pb}$

B. $Z = 1 - \frac{a}{VRT}$

C. $Z = 1 - \frac{Pb}{RT}$

D. $Z = 1 + \frac{Pb}{RT}$

Answer: B

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7. The intermolecular interaction that is dependent on the inverse cube of distance between the molecule is :

A. ion-ion interaction

B. ion-dipole interaction

C. London force

D. hydrogen bond.

Answer: D

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Recent Examination Questions

1. The pressure and temperature of $4dm^3$ of carbon dioxide gas are doubled. Then the volume of carbon dioxide gas would be

A. $2dm^3$

B. $3dm^3$

C. $4dm^3$

D. $8dm^3$

Answer: C

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2. Hydrogen diffuses six times faster than the gas A. The molar mass of gas A is

A. 72

B. 6

C. 24

D. 36

Answer: A

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3. A gas deviates from ideal behaviour at a high pressure because its molecules :

A. have kinetic energy

B. are bound by covalent bonds

C. attract one another

D. show the Tyndall effect

Answer: C

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4. In order to increase the volume of a gas by 10%, the pressure of the gas should be :

A. decreased by 10%

B. decreased by 1%

C. increased by 10%

D. increased by 1%

Answer: A

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5. Cooking is fast in a pressure cooker because :

A. 1. water boils at a higher temperature in a pressure cooker.

B. 2. Food is cooked at constant volume.

C. 3. Loss of heat due to radiation is minimum

D. 4. Food particles are effectively smashed

Answer: A

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6. The r.m.s. velocity of molecules of a gas of density 4kg $/m^3$ and pressure $1.2 \times 10^5 N/m^2$ is

A. 900 m / s

B. $120 m / s$

C. $600 m / s$

D. $300 m / s$

Answer: D

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7. 0.5 mol each of H_2, SO_2 and CH_4 are ketp in a container. A hole was made in the container. After 3 hours, the order of partial pressure in the container will be :

A. $pSO_2 > pCH_4 > pH_2$

B. $pH_2 > pSO_2 > pCH_4$

C. $pH_2 > pCH_4 > pSO_2$

D. $pSO_2 > pH_2 > pCH_4$

Answer: A

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8. For one mole of an ideal gas, increasing the temperature from $10^\circ C$ to $20^\circ C$.

A. 1. increases the average kinetic energy by two times.

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

C. 3. increase both the rms velocity by two times.

D. 4. increases both the average kinetic energy and rms velocity, but not significantly.

Answer: D

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9. The r.m.s. velocity of hydrogen is $\sqrt{7}$ times the r.m.s. velocity of nitrogen. If T is the temperature of

the gas :

A. $T_{N_2} = T_{H_2}$

B. $T_{H_2} = \sqrt{7}T_{N_2}$

C. $T_{N_2} = 2T_{H_2}$

D. $T_{N_2} = \sqrt{7}T_{H_2}$

Answer: C

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10. Which of the following gases has the highest value of r.m.s. velocity at 298 K ?

A. CH_4

B. CO

C. Cl_2

D. CO_2

Answer: A

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11. Density of carbon monoxide is maximum at

A. 2 atm and 600K

B. 0.5 atm and 273K

C. 6 atm and 1092K

D. 4 amt and 500K

Answer: D

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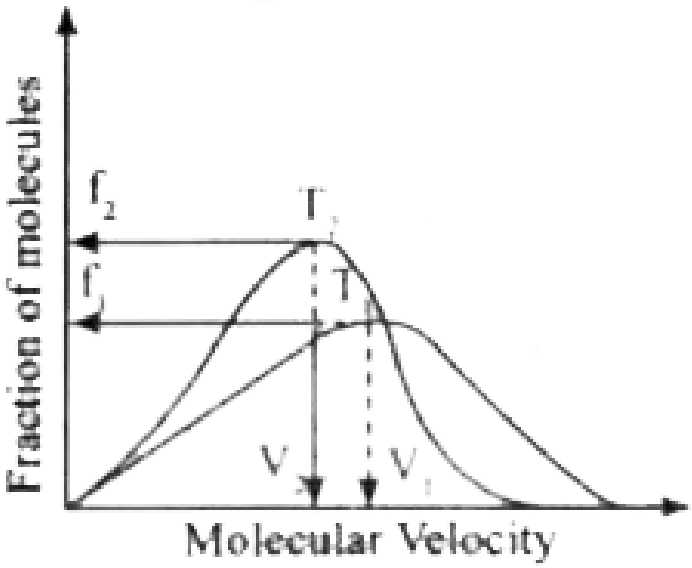
12. Plat of Maxwell.s distribution of velocities is gives below :



Which of the following is correct about this plot ?

A. $T_1 > T_2$

B. $T_1 < T_2$

C. $V_1 < V_2$

D. $f_1 > f_2$

Answer: A

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