CHEMISTRY

FOR IIT JEE ASPIRANTS OF CLASS 11 FOR CHEMISTRY

STATES OF MATTER

Worked Out Examples

1. Specific heat of a monoatomic gas at constant volume is $315 Jkg^{-1}K^{-1}$ and at a contant pressure is $525 Jkg^{-1}K^{-1}$. Calculate the molar of the gas.

A. $396 gmol^{-1}$

B. $39.6 gmol^{-1}$

C. $500 gmol^{-1}$

D. $50 gmol^{-1}$

Answer:

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2. A mixture of CO and CO_2 is found to have a density of 1.5 g/L at $30^\circ C$ and 740 torr . What is the composition of the mixture .

A. $CO = 0.3575, CO_2 = 0.64225$

B. $CO = 0.64225, CO_2 = 0.3575$

C. $CO = 0.500, CO_2 = 0.500$

D. $CO = 0.2500, CO_2 = 0.7500$

Answer:

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3. Calculate the density of N_2 gas at S.T.P ?

A. 1.250 g/L

B. 0.628 g/L

C. 2.450 g/L

D. 1.42 g/L

Answer:

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4. 5.6 litre of an unknown gas at NTP requires 12.5 calorie to raise its temperature by $10^{\circ}C$ at constant volume Calculate

(a) C_v of gas

(b) atomicity of gas .

A. 7 cal , 1

B. 5 cal , 1

C. 7 cal , 2

D. 5 cal , 1

Answer:

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5. A gas occupies 300 ml at $27^{\circ}C$ and 740 mm Hg pressure. Calculate its volume at S.T.P. ?

A. 0.3650 L

B. 0.2658 L

C. 200 L

D. 365 L

Answer:

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6. 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.

A. 10

B. 11

C. 20

D. 12

Answer:

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7. Calculate the compressibility factor for CO_2 if one mole of it occupies 0.4 litre at $300K$ and $40atm$. Comment on the result:

A. 0.65

B. 1

C. 1.65

D. 0.9

Answer:

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8. 20 dm^3 of SO_2 diffuse through a porous partition in 60 s. what volume of O_2 will diffuse under similar conditions in 30 s ?

A. $40dm^3$

B. $10dm^3$

C. $14.1 dm^3$

D. $28.2 dm^3$

Answer:

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9. 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. 100 cm

B. 81.1 cm

C. 75 cm

D. 90.1 cm

Answer:

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10. O_2 is collected over water at $20^\circ C$. The pressure inside shown by the gas is 740 mm of Hg . What is the pressure due to O_2 along if vapour pressure of H_2O is 18 mm at $20^\circ C$?

A. 740 mm

B. 370 mm

C. 722 mm

D. 758 mm

Answer:

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11. Calculate r.m.s speed of N_2 at 298 K in metre/s .

A. 515.2

B. 51.52

C. 103.4

D. 170.6

Answer:

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12. The average speed of an ideal gas molecule at $27^\circ C$ is $0.3m, \sec^{-1}$. The average speed at $927^\circ C$

A. $0.3ms^{-1}$

B. $0.6ms^{-1}$

C. $1.2ms^{-1}$

D. $2.4ms^{-1}$

Answer:

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13. The cirtical constant for water are $374^\circ C$ 218 atm and 0.0566 liter $mo1^{-1}$ Calculate a,b and R .

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Worked Out Questions

1. If a gas expands at constant temperature, it indicates that

A. Kinetic energy of molecules decreases

B. Pressure of the gas increases .

C. Kinetic energy of molecules remains the same

D. Number of the molecule of gas increases.

Answer:

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2. A : At high pressure , the compressibility factor Z is $\left(1+\frac{pb}{RT}\right)$.

R : At high pressure van der Wall's equation is modified as p(V - b) = RT` .

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is false.

D. Both Assertion and Reason are false.

Answer:

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Evaluate Yourself 1

1. Air at sea level is dense. This is a practical application of

A. Boyle's Law

B. Charle's Law

C. Kelvin's Law

D. Brown's Law

Answer: A

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2. 4.4 g of a gas at STP occupies a volume of 2.24 L. The gas can be :

A. O_2

B. CO

C. NO_2

D. CO_2

Answer: D

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3. Gas equation $PV = nRT$ is obeyed by

A. only isothermal process

B. only adiabatic

C. both (a) and (b)

D. none of these

Answer: C

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4. The volume occupied by 4.4 g of CO_2 at STP is

A. 22.4 l

B. 11.2 l

C. 2.24 l

D. None of these

Answer: C

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Evaluate Yourself 2

1. The ratio of the densities of hydrogen and oxygen at S.T.P is

A. $4:1$

B. $1:16$

C. $1:4$

D. $16:1$

Answer: B

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2. The densities of two gases are in the ratio of $1:16$. The ratio of their rates of diffusion is

A. $16:1$

B. $4:1$

C. $1:4$

D. $1:16$

Answer: B

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3. Under similar conditions of temperature and pressure the rate of diffusion is very low for the following gas

A. SO_2

B. CO_2

C. O_2

D. H_2

Answer: D

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4. 50 mL of hydrogen diffuse through a small hole from a vessel in 20 mintues time. Time taken for 40 ml of oxygen to diffuse out under similar conditions will be :

A. 12 min

B. 64 min

C. 8 min

D. 32 min

Answer: B

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5. In which of the following pairs the gaseous species diffuse through a porous plug with the same rate of diffusion -

A. CO, NO_2

B. NO_2, CO_2

C. NH_3, PH_3

D. NO, C_2H_6

Answer: D

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Evaluate Yourself 3

1. The compressibility factor for H_2 and He is usually

A. > 1

B. $= 1$

C. < 1

D. None of these

Answer: A

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2. If temperature increases, the surface tension of a liquid

A. increases

B. decreases

C. remains same

D. is reduced to zero

Answer: B

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

A. Ethyl alcohol

B. Methyl alcohol

C. Water

D. Benzene

Answer: C

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4. With the increasing molecular mass of a liquid the velocity:

A. decreases

B. increases

C. no effect

D. first increase then decrease

Answer: B

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5. A gas can be liquefied

A. at any temp

B. above its critical temperature

C. below its critical temperature

D. at $0^\circ C$

Answer: C

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6. Critical temperature of H_2O, NH_3, CO_2 and O_2 are 647 K, 405.6 K, 304.10 K and 1542 K respectively. If the cooling starts from 500 K to their critical temperature, the gas that lilquiefies first is

A. H_2O

B. NH_3

C. CO_2

D. O_2

Answer: B

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1. Which of the following substance is a gas at room temperature and atmospheric pressure

A. Iodine

B. Benzene

C. Chloroform

D. Methane

Answer: D

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2. Intermolecular forces of attraction are more in

A. Fluorine

B. Iodine

C. Bromine

D. Chlorine

Answer: B

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3. Which of the following statements is correct ?

A. Ideal gas molecules have both kinetic energy and potential energy

B. Ideal gas molecules have neither kinetic energy nor potential energy

C. Ideal gas molecules have only kinetic energy but no potential energy

D. Ideal gas molecules have only potential energy but no kinetic energy

Answer: C

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4. Strongest dipole - dipole interaction is present in the following substance

A. Hydrogen chloride gas

B. Hydrogen fluoride gas

C. Water vapour

D. Ammonia gas

Answer: B

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5. Hydrogen bond is an example for

A. ion- dipole interaction

B. dipole- dipole intersaction

C. dipole- induced dipole interaction

D. induced dipole - induced dipole interaction

Answer: B

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6. Practial unit of pressure in S. I system is

A. torr

B. Bar

C. atmosphere

D. Pascal

Answer: D

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7. What is the molar volume of a gas at SATP condition ?

A. 22.414 L

B. 22.711 L

C. 24.789 L

D. 21.780 L

Answer: C

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8. Density at S.T.P is very high for the following gas

A. Methane

B. Nitrogen

C. Helium

D. Carbon dioxide

Answer: D

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9. Vapour density of a gas is 15 . The gas can be

A. Ethane

B. Ozone

C. Ethylene

D. Phosphene

Answer: A

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10. Which of the following gas is highly water soluble

A. ammonia

B. Nitrogen

C. Oxygen

D. ozone

Answer: A

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11. 560 mL of oxygen gas (molar mass = 32 gm) at S.T.P contains 6×10^{22} molecules , 560 mL of sulphur dioxide gas

(molar mass = 64 gm) at S.T.P contains the following number of molecules

A. 6×10^{22}

B. 3×10^{22}

C. 12×10^{22}

D. 6×10^{11}

Answer: A

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12. For a given mass of gas isobar is the graph drawn between

A. P and volume at constant T

B. T and P at constant V

C. T and V at constant P

D. P and $\frac{1}{V}$ at constant T

Answer: C

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13. Which of the following gas deviates least from ideal nature at room temperature and atmospheric pressure

A. Nitrogen

B. Methane

C. Carbon dioxide

D. Helium

Answer: D

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14. Oxygen deviates more from ideal nature at

A. $T = 25^0C$, $P = 1$ atm

B. $T = 0^0C$, $P = 10$ atm

C. $T = -10^0C$, $P = 100$ atm

D. $T = 100^0C$, $P = 0.1$ atm

Answer: C

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15. Following are some gases with their compressibility factor values at S.T.P. The gas supposed to deviate least from ideal nature is

A. Gas A (Z = 1.15)

B. Gas B (Z = 0.98)

C. Gas C (Z = 0.86)

D. Gas D (Z = 0.92)

Answer: B

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16. For which of the following gas compressibility factor value increases with increase of pressure even at low

temperatures

A. sulphur dioxide

B. Methane

C. Helium

D. carbon monoxide

Answer: C

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17. Under similar conditions of temperature and pressure gas having highest rate of diffusion is

A. oxygen

B. acetylene

C. sulphur dioxide

D. carbon monoxide

Answer: D

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18. A pair of gases having same rate of diffusion at S.T.P

A. CO , NO

B. CO, CO_2

C. N_2O, NO_2

D. N_2O, CO_2

Answer: D

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19. Atmolysis is the method used to separate a mixture of

A. two liquids which differ in their boiling points by at least $40^\circ C$

B. two gases which differ in their rates of diffusion under similar conditions of T and P

C. two gases which have same rates of diffusion under similar conditions of T and P

D. two gases which react to form a solid

Answer: B

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20. Daltons law of partial pressures cannot be applied to the following pair of gases , when they are mixed

A. H_2 & O_2

B. H_2 & N_2

C. CO_2 & O_2

D. NH_3 & HCl

Answer: D

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21. A gas mixture contains oxygen and nitrogen in $1:2$ mole ratio . Ratio of the partial pressures of nitrogen and oxygen in the mixture is

A. $1:2$

B. $2:1$

C. $7:8$

D. $8:7$

Answer: B

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22. Which of the following gas cannot be collected over water dutring its preparation

A. oxygen

B. Nitrogen

C. Hydrogen

D. Hydrogen chloride

Answer: D

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23. Aqueous tension is very high at

A. $25^\circ C$

B. $40^\circ C$

C. $100^\circ C$

D. $30^\circ C$

Answer: C

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24. Which of the following statements regarding the inter molecular collisions in a gas is not correct

A. due to inter molecular collisions , directions of motion of molecules changes

B. due to inter molecular collisions , the pressure of the gas will not change

C. due to inter molecular collisions , the velocities of individual molecules changes

D. due to inter molecular collisions , average kinetic energy of gas molecules changes .

Answer: D

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25. Under similar conditions of temperature and pressure gas having highest most probable velocity is

A. Methane

B. Nitrogen

C. Oxygen

D. Helium

Answer: D

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26. Ratio of average kinetic energies of 28 gm of nitrogen and 16 gm of methane at room temperature and atmospheric pressure is

A. $1:1$

B. $7:4$

C. $4:7$

D. $2:5$

Answer: A

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27. Vanderwaal gas constant 'a' value is very high for the following gas

A. SO_2

B. He

C. O_2

D. CO_2

Answer: A

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28. Vander waal constant 'b' is very high for the following gas

A. Cl_2

B. He

C. O_2

D. CO_2

Answer: A

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29. Which of the following gas can be liquified very easily

A. $O_2(T_C = 154.4K)$

B. $C_2H_2(T_C = 308.6K)$

C. $CH_4(T_C = 190.7K)$

D. He $(T_C = 5.3K)$

Answer: B

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30. Which of the following has highest surface tension ?

A. H_2O

B. C_2H_5OH

C. $(CH_3)CO$

D. CCl_4

Answer: A

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31. Viscosity is very low for

A. Glycerol

B. Water

C. Acetone

D. Glucinol

Answer: C

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32. Vapour pressure is very high for the following liquid at room temperature

A. Water

B. Acetone

C. Diethyl ether

D. Benzene

Answer: C

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33. Which of the following statement is incorrect

A. Vapour pressure of a liquid increases with raise of temperature

B. Surface tension of a liquid decreases with raise of temperature

C. Viscosity of a liquid decreases with raise of temperature

D. Vapour pressure of a liquid decreases with raise of temperature

Answer: D

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34. Poise is the unit of

A. Viscosity

B. Surface tension

C. Surface energy

D. Vapour pressure

Answer: A

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35. Which of the following statement is incorrect

A. Liquid having high viscosity flows quickly

B. Rain drop assumes spherical shape due to the surface tension of water

C. Glass is a super cooled which appears like a solid

D. Standard boiling point of a liquid is less than its normal boiling point .

Answer: A

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Exercise 1

1. 2 gm of O_2 at $27^\circ C$ and 760 mm of Hg pressure has volume _____.

A. 1.5 lit

B. 2.8 lit

C. 11.2 lit

D. 22.4 lit

Answer: A

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2. Pressure of a gas in a vessel can be measured by

A. Barometer

B. Manometer

C. Stalgometer

D. All the above

Answer: B

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3. Volume occupied by an ideal gas at one atmospheric pressure and $0^{\circ} C$ is V ml. Its volume at 273 K will be

A. V ml

B. V/2 ml

C. 2 V

D. None of these

Answer: A

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4. Which one of the following statements is wrong for gases

A. Gases do not have a definite shape and volume

B. Volume of the gas is equal to the volume of the container confirming the gas

C. Confined gas exerts uniform pressure on the walls of its container in all directions

D. Mass of the gas cannot be determined by weighting a container in which it is enclosed

Answer: D

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5. Which of the following exhibits the weakest intermolecular forces?

A. NH_3

B. HCl

C. He

D. H_2O

Answer: C

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6. If $P, V,$ and T represent pressure, volume and temperature of the gas, the correct representation of Boyle's law is

A. $V \propto \frac{1}{T}$ (at constant P)

B. PV = RT

C. $V \propto \frac{1}{P}$ (at constant T)

D. pV = nRT

Answer: C

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7. At constant temperature, in a given mass of an ideal gas -

A. The ratio of pressure and volume always remains constant

B. Volume always remains constant

C. Pressure always remains constant

D. The product of pressure and volume always remains constant

Answer: D

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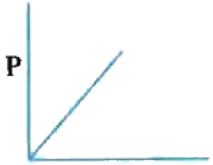
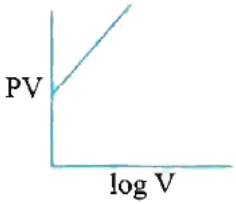
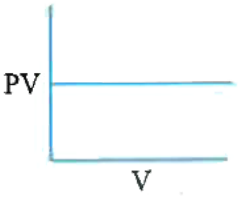
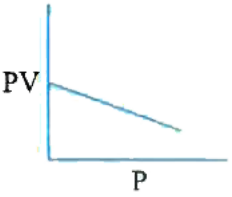
8. Which of the following graph represent Boyle's law ?

A. 

B. 

C. 

D. 

Answer: C

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9. At constant pressure , the volume of fixed mass of an ideal gas is directly proportional to

A. Absolute temperature

B. Degree contigrade

C. Degree Fahrenheit

D. None

Answer: A

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10. In a closed vessel of 5 litres capacity, 1 g of O_2 is heated from 300 to $600K$. Which statement is not correct ?

A. Pressure of the gas increases

B. The rate of collision increases

C. The number of moles of gas increases

D. The energy of gaseous molecules increases

Answer: C

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11. S.I. unit of gas constant R is

A. 0.0821 litre atm $K^{-1}\text{mole}^{-1}$

B. 2 calories $K^{-1}\text{mole}^{-1}$

C. 8.31 joule $K^{-1}\text{mole}^{-1}$

D. None

Answer: C

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12. If three unreactive gases having partial pressures , P_A, P_B and P_C and their moles are 1 , 2 and 3 respectively then their total pressure will be

A. $P = P_A + P_B + P_C$

B. $P = \frac{P_A + P_B + P_C}{6}$

C. $P = \frac{P_A + P_B + P_C}{3}$

D. None

Answer: A

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13. 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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14. A gas diffuse $\frac{1}{5}$ times as fast as hydrogen at same pressure. Its molecular weight is

A. 50

B. 25

C. $25\sqrt{2}$

D. $50\sqrt{2}$

Answer: A

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15. Which of the following pairs will effuse at the same rate through a porous plug .

A. CO , NO_2

B. NO_2, CO_2

C. NH_3, PH_3

D. NO, C_2H_6

Answer: D

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16. 4.4 g of a gas at STP occupies a volume of 2.24 L. The gas can be :

A. O_2

B. CO

C. NO_2

D. CO_2

Answer: D

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17. The rate of diffusion of hydrogen gas is

A. 1.4 times of He gas

B. Same as He gas

C. 5 times to He gas

D. 2 times to He gas

Answer: A

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

A. 72

B. 6

C. 24

D. 36

Answer: A

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19. If the absolute temperature of a gas is doubled and the pressure is reuced to one-half, the volume of the gas will

_____

A. Remain unchange

B. Will be double

C. Will be four time

D. will be half

Answer: C

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20. The kinetic energy of 1 mole of gas is equal to -

A. 1.5 RT

B. RT

C. 0.5 RT

D. 2.5 RT

Answer: A

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

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

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

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

D. $P = 2E$

Answer: A

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22. 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 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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23. Which of the following expressions correctly represents the relationship between the average molar kinetic energies (KE) of CO and N_2 molecules at the same temperature?

A. $\overrightarrow{KE}_{CO} = \overrightarrow{KE}_{N_2}$

B. $\overrightarrow{KE}_{CO} > \overrightarrow{KE}_{N_2}$

C. $\overrightarrow{KE}_{CO} < \overrightarrow{KE}_{N_2}$

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

Answer: A

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24. An ideal gas will have maximum density when

A. $P = 0.5$ atm , T = 600 K

B. P = 2 atm , T = 150 K

C. P = 1 atm , T = 300 K

D. P = 1.0 atm , T = 500 K

Answer: B

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25. Absolute zero is defined as the temperture

A. At which all molecular motion ceases

B. At which liquid helium boils

C. At which ether boils

D. All of the above

Answer: A

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26. The ratio among most probable velocity, mean velocity and root mean velocity is given by

A. $1:2:3$

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

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

D. $\sqrt{2}:\sqrt{8/\pi}:\sqrt{3}$

Answer: D

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27. Which of the following has maximum root mean square velocity at the same temperature ?

A. SO_2

B. CO_2

C. O_2

D. H_2

Answer: D

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28. A temperature at which rms speed of SO_2 molecule is half of that of helium molecules at $300K$

A. 150 K

B. 600 K

C. 900 K

D. 1200 K

Answer: D

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29. At $27^\circ C$, the ratio of rms speed of ozone to that of oxygen is :

A. $\sqrt{3/5}$

B. $\sqrt{4/3}$

C. 0.25

D. $\sqrt{2/3}$

Answer: D

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30. Choose the correct arrangement, where the symbols have their usual meanings

A. $\overrightarrow{u} > u_p > u_{rms}$

B. $u_{rms} > \overrightarrow{u} > u_p$

C. $u_p > \overrightarrow{u} > u_{rms}$

D. $u_p > u_{rms} > \overrightarrow{u}$

Answer: B

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

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

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

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

D. $U_{rms} = \sqrt{\frac{E}{3M}}$

Answer: C

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32. Gases deviate from the ideal gas behaviour because their molecules

A. Possess negligible volume

B. Have forces of attraction between them

C. Are polyatomic

D. Are not attracted to one another

Answer: B

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33. The compressibility factor of a gas is defined as $z = PV/RT$. The compressiblity factor of ideal gas is _____.

A. 0

B. Infinity

C. 3

D. -1

Answer: C

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34. In Vander Waal's equation of state for a non-ideal gas, the term that accounts for intermolecular forces is

A. (V- b)

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

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

D. RT

Answer: D

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35. A gas is said to behave like an ideal gas when the relation $\frac{pV}{T}$= constant. When do you expect a real gas to behave like an ideal gas ?

A. When the temperature is low

B. When both the temperature and pressure and low

C. When both the temperature and pressure are high

D. When the temperature is high and pressure is low

Answer: A

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

A. Volume occupied by the molecules

B. Intermolecular attraction

C. Intermolecular repulsions

D. Intermolecular collisions per unit volume

Answer: A

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37. Which set of conditions represent the easiest way to cool a gas ?

A. Low temperature and high pressure

B. High temperature and low pressure

C. Low temperature and low pressure

D. High temperature and high pressure

Answer: A

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38. Adiabatic demagnetisation is a technique used for

A. Adiabatic expansion of a gas

B. Product of low temperature

C. Production of high temperature

D. None

Answer: B

View Text Solution

39. An ideal gas cannot be liquified because

A. Its critical temperature is always above $0^{\circ} C$

B. Its molecules are relatively smaller in size .

C. It solidifies before becoming a liquid .

D. Forces operative between its molecules are negligible .

Answer: D

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40. An ideal gas obeying theory of gases can be liquefied if

A. Its temperature is more than critical temperature T_c

B. Its pressure is more than critical pressure P_c

C. Its pressure is less than at a temperature less than

D. It cannot be liquefied at any value of P and T

Answer: D

Watch Video Solution

Exercise 2

1. Dominance of strong repulsive forces among the molecules of the gas ($Z =$ compressibility factor)

A. Depends on Z and indicated by Z = 1

B. Depends on Z and indicated by $Z > 1$

C. Depends on Z and indicated by $Z < 1$

D. is independent of Z .

Answer: B

Watch Video Solution

2. How will you separate mixture of two gases ?

A. Fractional distillation technique

B. Grahm's law

C. Osmosis

D. Chromatography

Answer: B

View Text Solution

3. Containers A and B have same, gases. Pressure, volume and temperature of A are all twice that of B, then the ratio of number of molecules of A and B are

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: B

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4. How much time would it take to distribute one Avogadro number of wheat grains, if 10^{10} grains are distributed each second?

A. 4×10^2 year

B. 9×10^6 year

C. 6×10^4 year

D. 2×10^6 year

Answer: D

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5. If $10g$ of a gas at atmospheric pressue is cooled from $273^\circ C$ to $0^\circ C$, keeping the volume constant, its pressure would become

A. 1/2 atm

B. 1/273 atm

C. 2 atm

D. 273 atm

Answer: A

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6. Pressure of 1 g of an ideal gas A at $27^{\circ}C$ is found to be 2 bar, when 2 g of another gas B is introduced in the same flask at same temperature. The pressure becomes 3 bar. Find a relationship between their molecular masses.

A. $M_A = 4M_B$

B. $M_B = 4M_A$

C. $M_A = 2M_B$

D. $M_B = 2M_A$

Answer: B

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7. Density of a gas is found to be $5.46 / dm^3$ at $27^\circ C$ at 2 bar pressure What will be its density at STP ? .

A. 6 gm/l

B. 8 gm/l

C. 2.75 gm/l

D. 1.5 gm/l

Answer: C

Watch Video Solution

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

A. H_2 and SO_2

B. H_2 and Cl_2

C. H_2 and CO_2

D. CO_2 and Cl_2

Answer: B

Watch Video Solution

9. Equal weights 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

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10. A mixture of dihydrogen and dioxygen at one bar pressure contains 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen.

A. 0.8 bar

B. 0.4 bar

C. 1.6 bar

D. 3.2 bar

Answer: A

Watch Video Solution

11. At what temperature, the rate of effusion of N_2 would be 1.625 times than the rate of SO_2 at $500^\circ C$?

A. 273 K

B. 830 K

C. 110 K

D. 173 K

Answer: B

Watch Video Solution

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

A. 0.6 m/sec

B. 0.3 m/sec

C. 0.9 m/sec

D. 3.0 m/sec

Answer: A

Watch Video Solution

13. The average kinetic energy associated with one mole of a gas is

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

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

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

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

Answer: C

Watch Video Solution

14. The compressibility factor of gases is less than unity at STP. Therefore,

A. $V_m > 22.4$litre

B. $V_m < 22.4$ litre

C. $V_m = 22.4$ litre

D. $V_m = 44.8$ litre

Answer: B

Watch Video Solution

15. In van der Waals equation of state for a non-ideal gas , the term that accounts for intermolecular forces is

A. (V- b)

B. RT

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

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

Answer: C

Watch Video Solution

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

A. O_2

B. N_2

C. NH_3

D. CH_4

Answer: C

Watch Video Solution

17. 380 mL of a gas at $27^\circ C$, 800 mm of Hg weights 0.455 g .

The mol., wt. of gas is :

A. 27

B. 28

C. 29

D. 30

Answer: B

Watch Video Solution

18. $34.05mL$ of phosphorus vapours weighs $0.0625g$ at $546^\circ C$ and 0.1 bar pressure. What is the molar mass of phossphorus ?

A. 1247.7 g

B. 1147.0 g

C. 1047` g

D. 947.7 g

Answer: A

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19. Calculate the total pressure in a mixture og $8g$ of oxygen and $4g$ hydrogen confined in a vessel of $1dm^3$ at $27^\circ C$.

$(R = 0.083 \text{bar} dm^3 K^{-1} mol^{-1})$

A. 28.5 bar

B. 56.025 bar

C. 112.5 bar

D. 14.25 bar

Answer: B

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20. $2.9g$ of a gas at $95^\circ C$ occupied the same volume as $0.184g$ of hydrogen at $17^\circ C$ at same pressure What is the molar mass of the gas ? .

A. $120 gmol^{-1}$

B. $20gmol^{-1}$

C. $80gmol^{-1}$

D. $40gmol^{-1}$

Answer: D

Watch Video Solution

21. The drain cleaner, Drainex contains small bits of aluminium which react with caustic soda to produce dihydrogen. What volume of dihydrogen at $20^{\circ}C$ and one bar will be released when 0.15 g of aluminium reacts?

A. 202.5 ml

B. 102.5 ml

C. 101. 25 ml

D. 405.0 ml

Answer: A

Watch Video Solution

22. Calculate the temperature of 4.0 mol of a gas occupying d dm^3 at 3.32 bar. (R=0.083 bar $dm^3 K^{-1} mol^{-1}$).

A. 100 K

B. 50 K

C. 150 K

D. 200 K

Answer: B

Watch Video Solution

23. Calculate the volume occupied by $8.8g$ of CO_2 at $31.3^\circ C$ and 1 bar pressure. $\left(R = 0.083 \text{bar} LK^{-1}mol^{-1}\right)$

A. 10.1 Litre

B. 8.0 Litre

C. 2.0 Litre

D. 5.05 Litre

Answer: D

Watch Video Solution

24. When $2g$ of a gas A is introduced into an evacuated flask kept at $25^\circ C$, the pressure is found to be $1atm$. If $3g$ of another gas B is then heated in the same flask, the total pressure becomes $1.5atm$. Assuming ideal gas behaviour, calculate the ratio of the molecular weights M_A and M_B.

A. $1:3$

B. $1:4$

C. $4:1$

D. $3:1$

Answer: A

Watch Video Solution

25. 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. 0.23

B. 0.19

C. 0.39

D. 0.30

Answer: D

Watch Video Solution

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

A. 73 K

B. 100 K

C. 200 K

D. 510 K

Answer: C

Watch Video Solution

27. 40 mL of mixture of H_2 & O_2 was placed in a gas burette at $18^\circ C$ and 1 atm . A spark was produced so that the formation of water was complete . The remaining pure gas had a volume of 10 mL of $18^\circ C$ & 1 atm . If the remaining gas was H_2 what was initial mole % of H_2 in mixture ?

A. 0.75

B. 0.25

C. 0.6

D. 0.45

Answer: A

View Text Solution

28. 24 ml of water gas containing only hydrogen and carbon monoxide in equal proportions by volume are exploded with 80 ml of air in which 20% by volume is O_2 , if all gasesous are measured at room temperature and pressure , calculate the composition by volume of the unreacted resulting gaseous mixture .

A. $O_2 \to 12ml N_2 \to 64ml CO_2 \to 4ml$

B. $O_2 \to 4ml N_2 \to 12ml CO_2 \to 64ml$

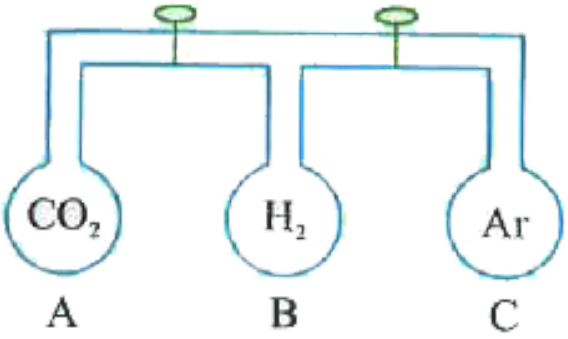
C. $O_2 \to 64ml N_2 \to 4ml CO_2 \to 12ml$

D. $O_2 \to 4ml N_2 \to 64ml CO_2 \to 12ml$

Answer: D

View Text Solution

29. The apparatus shown consists of three bulbs connected by stopcocks of negligible volume . The temperature is constant .



$P_A = 2.13atm$ $P_B = 0.861$atm

$P_C = 1.15atm$ $V_A = 1.50$ L

$V_B = 1.0L$ $V_C = 2.0$ L

When all the stopcocks are opened , the pressure in the bulb 'B' will be

A. 1.41 atm

B. 0.861 atm

C. 1.38 at m

D. 1.18 atm

Answer: A

View Text Solution

30. What will be the pressure exerted by a mixture of $3.2g$ of methane and $4.4g$ of carbon dixide contained in a $9dm^3$ flask at $27^\circ C$? .

A. 8.314 Pa

B. 8.314×10^2 Pa

C. 2×10^2 Pa

D. 8.314×10^4 Pa

Answer: D

Watch Video Solution

31. What will be the pressure of the gas mixture when 0.5 litre of H_2 at 0.8 bar and 2.0 litre of oxygen at 0.7 bar are introduced in a 1 litre vessel at $27^\circ C$.

A. 4 bar

B. 1.8 bar

C. 0.9 bar

D. 3.6 bar

Answer: B

Watch Video Solution

32. A student forgot to add the reaction mixture to the round bottomed open flask at $27^\circ C$ and put it on the flame After a lapse of time he realized his mistake using a pyrometer he found the temperature of the flask was $477^\circ C$ What fraction of air would have been expelled out ? .

A. $5/3$

B. $5/6$

C. $3/5$

D. $6/5$

Answer: C

Watch Video Solution

33. A gaseous compound X contained 44.4% C , 51.9 % N and 3.7% H . Under like conditions $30cm^3$ of X diffused through a pinhole in 25 sec and the same volume of H_2 diffused in 4.81 sec . The molecular formula of X is

A. C_2H_2N

B. $C_2H_4N_2$

C. $C_2H_2N_2$

D. $C_4H_2N_2$

Answer: C

View Text Solution

34. The rms velocity molecules of a gas of density $4kgm^{-3}$ and pressure $1.2 \times 10^5 Nm^{-2}$ is

A. $300ms^{-1}$

B. $900ms^{-1}$

C. $120ms^{-1}$

D. $600ms^{-1}$

Answer: A

Watch Video Solution

35. For a real gas obeying van der waal's equation , graph is plotted between PV_m (y- axis) and P (x - axis) where V_m is molar volume . Y - intercept the graph is

A. RT

B. $\left(P + \frac{a}{V^2}\right)$

C. $\frac{RT}{V - b}$

D. cannot be determined

Answer: A

Watch Video Solution

36. 1 litre capacity flask containing NH_3 at 1 atm and $25^\circ C$ A spark is passed through until all the NH_3 is decomposed into N_2 and H_2 Calculate the pressure of gases left at $25^\circ C$

.

A. 2 atm

B. 0.5 atm

C. 1.5 atm

D. 1 atm

Answer: A

Watch Video Solution

37. The temperature of an ideal gas is increased from $140K$ to $560K$. If a $140K$ the root mean square velocity of the gas molecule is V, at $560K$ it becomes

A. 5 u

B. 2 u

C. u/2

D. u/4

Answer: B

Watch Video Solution

38. The circulation of blood in human body supplies O_2 and releases CO_2. The concentration of O_2 and CO_2 is variable but on the average, 100 mL blood contains 0.02 g of O_2 and 0.08 g of CO_2. Calculate the volume of O_2 and CO_2 at 1 atmosphere and body temperature of $37^\circ C$ assuming 10 L of blood in human body.

A. 2 litre , 4 litre

B. 1.5 litre , 4.5 litre

C. 1.59 litre , 4.627 litre

D. 3.82 litre , 4.62 litre

Answer: C

Watch Video Solution

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

A. $75\ \%$, $25\ \%$

B. $25\ \%$, $75\ \%$

C. $30\ \%$, $70\ \%$

D. $40\ \%$, $60\ \%$

Answer: A

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40. A gas bulb containing air is connected to an open limb manometer at $27^{\circ}C$ and at 750 mm Hg . Assuming that intially the level of Hg in the both limbs were same . The bulb was heated to $77^{\circ}C$, what will be differences in the levels of Hg in two limbs ? (Assuming the volume difference of the gas produced is negligible at higher temperature) .

A. 7.5 cm Hg

B. 8 cm Hg

C. 6 cm Hg

D. 12.5 cm Hg

Answer: D

View Text Solution

41. Calculate the density of CO_2 at $100^\circ C$ and $800mm$ hg pressure .

A. $1.212g \text{ litre}^{-1}$

B. $1.5124g\text{litre}^{-1}$

C. $2.1124g\text{litre}^{-1}$

D. $1.012g\text{litre}^{-1}$

Answer: B

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42. A vessel contains 1 mole of O_2 at $27^\circ C$ and 1 atm pressure. A certain amount of the gas was withdrawn and the vessel was heated to $327^\circ C$ to maintain the pressure of 1 atm. The amount of gas removed was

A. 0.2 mole

B. 0.5 mole

C. 0.25 mole

D. 0.1 mole

Answer: B

Watch Video Solution

Exercise 3

1. A $4:1$ mixture of helium and methane contained in a vessel at 10 bar pressure. During a hole in the vessel, the gas mixture leaks out. The composition of the mixture effusing out initially is

A. $8:1$

B. $8:3$

C. $4:1$

D. $1:1$

Answer: A

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2. 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

Watch Video Solution

3. A $4.0dm^3$ flask containing N_2at4 bar was connected to a $6.0dm^3$ flask containing helium at 6 bar , and the gases were

allowed to mix isothermally. The total pressure of the resulting mixture will be

A. 10.0 bar

B. 5.2 bar

C. 1.6 bar

D. 5.0 bar

Answer: B

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4. 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 hydrogen chloride bottle

C. near the ammonia bottle

D. throughtout the length of the tube .

Answer: B

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5. If a gas expands at constant temperature, it indicates that

A. Kinetic energy of molecules decreases

B. Pressure of the gas increases .

C. Kinetic energy of molecules remains the same

D. Number of the molecule of gas increases.

Answer: C

Watch Video Solution

6. A certain mass of the oxygen gas occupies 7 L volume under a pressure of 380 mm Hg . The volume of the same mass of the gas at standard pressure , with temperature remaining constant , shall be

A. 26.60 L

B. $54.28L$

C. $3.5L$

D. 7 L

Answer: C

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7. A gas can be liquefied

A. A gas can be liquified at any temp

B. above its critical temperature

C. below its critical temperature

D. at $0^\circ C$

Answer: C

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8. The critical temperatures of O_2, N_2, H_2 and CO_2 are $154.3K, 126K, 33.2K,$ and $304K$ respectively. The extent of

adsorption on tungsten is highest in case of

A. H_2

B. N_2

C. O_2

D. CO_2

Answer: D

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9. Critical temperature of H_2O, NH_3, CO_2 and O_2 are 647 K, 405.6 K, 304.10 K and 1542 K respectively. If the cooling starts from 500 K to their critical temperature, the gas that lilquiefies first is

A. H_2O

B. NH_3

C. CO_2

D. O_2

Answer: B

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10. The units of constants a in van der Waal's equation is

A. $dm^6 atmmol^{-1}$

B. $dm^3 atmmol^{-1}$

C. $dmatmmol^{-1}$

D. $atmmol^{-1}$

Answer: A

Watch Video Solution

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

A. 48.9 atm

B. 4.89 atm

C. 0.489 atm

D. 489 atm

Answer: B

Watch Video Solution

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

A. 1

B. 4

C. 3

D. 8

Answer: B

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

A. 7.6×10^3 m/s

B. 3.8×10^3 m/s

C. 0.95×10^3 m/s

D. 0.475×10^3 m/s

Answer: C

Watch Video Solution

14. At what temperature, the r.m.s. velocity of a gas measured at $50^\circ C$ will become double ?

A. 626 K

B. 1019 K

C. $200^\circ C$

D. $1019^\circ C$

Answer: D

Watch Video Solution

15. The Temperature at which 28 g of N_2 will occupy a volume of 10.0 L at 2.46 atm is

A. 299.6 K

B. $0^\circ C$

C. $273K$

D. $10^{\circ} C$

Answer: A

Watch Video Solution

16. A mixture of gases having different molecular weights is separated by which method ?

A. Atmolysis

B. Metathesis

C. Ostwald and Walker method

D. Reverse osmosis

Answer: A

View Text Solution

View Text Solution

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

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

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

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

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

Answer: A

Watch Video Solution

18. What will be the partial pressures of He and O_2 respectively if 200 ml of He at 0.66 atm pressure and 400 ml of O_2 at 0.52 atm pressure are mixed in 400 ml vessel at $20^\circ C$?

A. 0.33 and 0.56

B. 0.33 and 0.52

C. 0.38 and 0.52

D. 0.25 and 0.45

Answer: B

Watch Video Solution

19. A gaseous mixture was prepared by taking equal moles of CO and N_2. If the total pressure of the mixture was found to be 1 atomosphere, the partical pressure of the nitrogen (N_2) in the mixture is

A. 1 atm

B. 0.5 atm

C. 0.8

D. 0.9 atm

Answer: B

 Watch Video Solution

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

A. 1.4

B. 2.0

C. 2.8

D. 4.0

Answer: A

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21. Two gases A and B having the same volume diffuse through a porous partition in 20 and 10 seconds

respectively. The molar mass of A is $49u$. Molar mass of B will be

A. $25.00u$

B. $50.00u$

C. $12.25u$

D. $6.50u$

Answer: C

Watch Video Solution

22. What will happen to volume of a bubble of air found under water in a lake where temperature is $15^\circ C$ and the pressure is 1.5 atm, if the bubble 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 smallest by a factor of 0.70

Answer: B

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23. A mixture contains 64 g of dioxygen and 60 g of neon at a total pressure of 10 Bar. The partial pressure in bar of dioxygen and neon are respectively (atomic masses $O = 16, Ne = 20$)

A. 4 and 6

B. 6 and 4

C. 5 and 5

D. 8 and 2

Answer: A

Watch Video Solution

24. Choose the incorrect statement in the following .

A. Surface tension is the force acting per unit length perpendicular to the line drawn on the surface of the liquid

B. Surface tension of a liquid increases with increase in temperature

C. The SI unit of surface tension in Jm^{-2}

D. Viscosity is a measure of resistance for the flow of liquid .

Answer: B

View Text Solution

25. A certain gas takes three times as long to effuse out as helium. Its molar mass will be

A. 64 u

B. 9 u

C. 27 u

D. 36 u

Answer: D

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26. For real gases, van der Waals' equation is written as

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

where a and b are van der Waals' constants.

Two sets of gases are:

$(I) O_2, CO_2, H_2$ and $He (II) CH_4, O_2$ and O_2 and H_2

The gases given in set I in increasing order of b and gases given in set II in decreasing order of a are arranged below.

Select the correct order from the following:

A. $H_2 < He < O_2 < CO_2 (II) CH_4 > O_2 > H_2$

B. $(I) H_2 < O_2 < He < CO_2 (II) O_2 > CH_4 > H_2$

C. $(I)He < H_2 < CO_2 < O_2(II)CH_4 > H_2O_2$

D. $(I)O_2 < He < H_2 < CO_2(II)H_2 > O_2 > CH_4$

Answer: A

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27. 50 mL each of gases A and B take 150 and 200 seconds respectively for effusing through a pin- hole under the similar conditions . If molecular mass of B is 36 , the molecular mass of A will be nearly

A. 64

B. 96

C. 128

D. 20

Answer: D

View Text Solution

28. Maximum deviation from ideal gas is expected from

A. $N_2(g)$

B. $CH_4(g)$

C. $NH_2(g)$

D. $H_2(g)$

Answer: C

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29. Dipole-induced dipole interaction are present in which of the following pairs

A. Cl_2 and CCl_4

B. HCl and He atoms

C. SiF_4 and He atoms

D. H_2O and alcohol

Answer: C

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30. Equal masses of H_2, O_2 and methane have been taken in a container of volume V at temperature $27^\circ C$ in identical

conditions. The ratio of the volume of gases $H_2 : O_2$: methane would be

A. $8:1:2$

B. $8:16:1$

C. $16:8:1$

D. $16:1:2$

Answer: D

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

A. high temperature and high pressures

B. low temperature and low pressures

C. high temperatures and low pressure

D. low temperatures and high pressures

Answer: C

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

A. $1/8$

B. $1/4$

C. $3/8$

D. $1/2$

Answer: A

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Exercise 4 Examplar Problems

1. A person living in shimla observd that cooking without using pressure cooker takes more time. The reason for this observation is that at high altitude

A. pressure increases

B. temperature decreases

C. pressure decreases

D. temperature increases

Answer: C

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2. 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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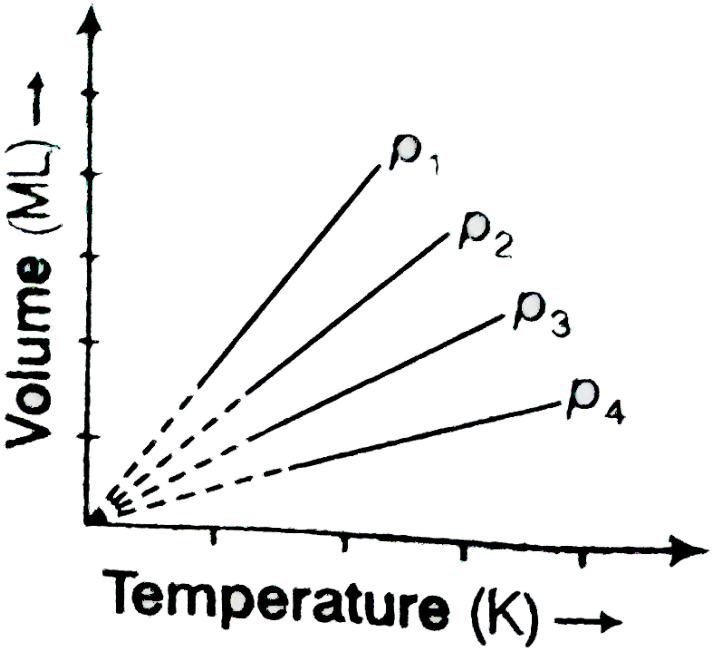
3. A plot of volume (V) versus temperature (T) for a gas at constant pressure is a straight line passing through the origin. The plots at different values of pressure are shown in figure. Which of the following order of pressure is correct

for this gas ?



A. $P_1 > P_2 > P_3 > P_4$

B. $P_1 = P_2 = P_3 = P_4$

C. $P_1 < P_2 < P_3 < P_4$

D. $P_1 < P_2 = P_3 < P_4$

Answer: C

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4. the interaction energy of London force is inversely proportional to sixth power of the distance between two interaction particles but their mahnitude depends upon

A. charge of interacting particles

B. mass of interacting particles

C. polarisability of interacting particles

D. strength of permanent dipoles in the particles .

Answer: C

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5. Dipole-dipole forces act between the molecules possessing permanent dipole. Ends of dipoles possess 'partial charges'. The partial charge is

A. more than unit electronic charge

B. equal to unit electronic charge

C. less than unit electronic charge

D. double the unit electronic charge

Answer: C

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6. 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. 0.8×10^5 atm

B. $0.008 Nm^{-2}$

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

D. 0.25 atm

Answer: C

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7. 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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8. Gases posses 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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9. 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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10. Atmospheric pressure recorded in different citie are as follows

Cities	Shimla	Bangalore	Delhi	Mumbai
p in N/m^2	1.01×10^5	1.2×10^5	1.02×10^5	1.21×10^5

Consider the above data mark the place at which liquid will boil first.

A. Shimla

B. Bangalore

C. Delhi

D. Mumbai

Answer: A

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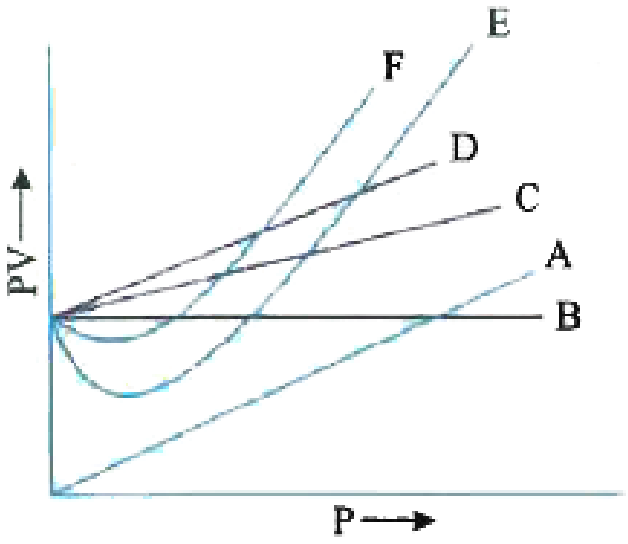
11. Which curve in the following graph represents the curve of ideal gas ?



A. B only

B. C and D only

C. E and F only

D. A and B only

Answer: A

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12. Increase in kinetic energy can overcome intermolecular forces of attraction. How will the viscosity of liquid be affected by the increase in temperature ?

A. increases

B. No effect

C. Decrease

D. No regular pattern will be followed

Answer: C

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13. How does the surface tension of a liquid vary with increase in temperature ?

A. Remains same

B. Decreases

C. Increases

D. No regular pattern is followed

Answer: B

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14. With regard to the gaseous state of matter which of the following statemen are correct ?

A. Complete order of molecules

B. Complete disorder of molecules

C. All molecules have same velocity

D. Fixed position of molecules

Answer: B

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15. Which of the following figures does not represent 1 mole of dioxygen gas at STP ?

A. 32 grams of gas

B. 22.4 litres of gas

C. 6.022×10^{23} dioxygen molecules

D. 11.2 litres of gas

Answer: D

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16. Under which of the following conditions applied together, a gas deviates most from the ideal behaviour ?

A. Low pressure , Low temperature

B. High pressure , Low temperature

C. High pressure , High temperature

D. Low pressure , High temperature

Answer: B

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17. Which of the following changes decrease the vapour pressure of water kept in a sealed vessel ?

A. Decreasing the quantity of water

B. Adding salt to water

C. Decreasing the volume of the vessel to one-half

D. Increasing the temperature of water

Answer: B

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18. If 1 g of each of the following gases are takes at STP, which of the gases will occupy (a) greatest volume and (b)

smallest volume ?

Co, H_2O, CH_4, NO

A. CH_4, NO

B. H_2O, CH_4

C. NO, CH_4

D. CO, NO

Answer: A

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19. The molar volume of dinitrogen at 273.15 K and 1 atm pressure is 22.4 L . The molar volume of argon , a mono atomic gas at 273. 15 K and 1 atm present is

A. 44.8 L

B. 22.4 L

C. 11.2 L

D. 5.6 L

Answer: B

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20. The correct decreasing order of surface tension for water , ethanol and n - hexane is

A. n hexane $<$ ethanol $<$ water

B. Water $>$ ethanol $>$ n -hexane

C. n- hexane $<$ water $<$ ethanol

D. ethanol $<$ water $<$ n - hexane

Answer: B

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21. Critical temperature (T_C) and critical pressure (P_C) of carbon dioxide gas are $30.98^\circ C$ and 73 atm . Carbon dioxide gas cannot be liquified under following conditions

A. $t = 30.98^\circ C$, P = 73 atm

B. $t = 30.98^\circ C, P = 83$ atm

C. $t = 32^\circ C, P = 80$ atm

D. $t = 30.98^\circ C, P = 85$ atm

Answer: C

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22. The correct increasing order of Vanderwaal constant 'b' for H_2, O_2, CO_2 , He gases is

A. $H_2 < He < O_2 < CO_2$

B. $He < H_2 < O_2 < CO_2$

C. $He < H_2 < CO_2 < O_2$

D. $CO_2 < O_2 < He < H_2$

Answer: A

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23. The correct decreasing order of Vanderwaal constant 'a' for H_2, CH_4, O_2 , gases is

A. $H_2 < CH_4 < O_2$

B. $CH_4 < O_2 < H_2$

C. $CH_4 > O_2 > H_2$

D. $H_2 > CH_4 > O_2$

Answer: C

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24. The viscosity order of water , n - hexane and glycerol is

A. n - hexane $>$ water $>$ glycerol

B. water $>$ n-hexane $>$ glycerol

C. glycerol $>$ water $>$ n - hexane

D. glycerol $>$ n- hexane $>$ water

Answer: C

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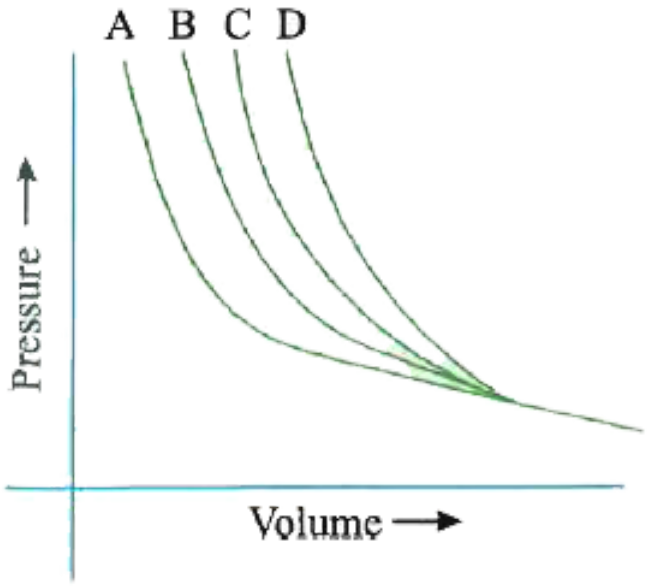
25. At certain temperature the volume - pressure curves for four gases A , B , C and D are as shown below . The gas that

deviates least from ideal nature is



A. B

B. D

C. C

D. A

Answer: D

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A R Type Questions

1. Assertion (A) : The heat absorbed during the isothermal expansion of an ideal gas against vacuum is zero .

Reason (R) : The volume occupied by the molecules of an ideal gas is zero .

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: B

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2. Assertion: The value of van der Waals constant a is larger for ammonia than for nitrogen.

Reason: Hydrogen bonding is present in ammonia.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: A

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3. Assertion: Helium shows only positive deviations from ideal behaviour.

Reason: Helium is an inert gas.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: B

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4. Assertion (A) : CH_4, CO_2 has value of Z (compressibility factor) less than one a $0^\circ C$.

Reason (R) : For every molecule there are three rotational degree of freedom .

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: A

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5. STATEMENT-1 : The average translational kinetic energy per molecule of the gas per degree of freedom is 1/2 KT.

STATEMENT-2 : For every molecule there are three rotational degree of freedom.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: C

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6. Assertion: van der Waals equation is applicable only to non-ideal gases.

Reason: Ideal gases obey the equation $PV = nRT$.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: B

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7. Assertion:Pressure is exerted by gas in a container with increasing temperature of the gas.

Reason: With the rise in temperature, the average speed of gas molecules increases.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: A

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8. Assertion: Gases do not settle at the bottom of container.

Reason: Gases have high kinetic energy.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: A

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9. Assertion: A mixture of He and O_2 is used for respiration for deep sea divers.

Reason: He is soluble in blood.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: C

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10. Assertion (A) : All molecules in a gas have some speed .

Reason (R) : Gas contains molecules of different size and shape .

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: D

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11. Assertion: Effusion rate of oxygen is smaller than nitrogen.

Reason: Molecular size of nitrogen is smaller than oxygen.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: C

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12. Assertion: Compressibility factor for hydrogen varies with pressure with positive slope at all pressures.

Reason: Even at low pressures, repulsive forces dominate hydrogen gas.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: A

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13. Assertion (A) : At high pressure , for one mole of a real gas , the compression factor Z is $\left(1+\frac{Pb}{RT}\right)$

Reason (R) : At high pressure , for one mole of a real gas , vanderwall equation is modified as P(V-b) = RT

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: A

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14. 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. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: D

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15. Assertion (A) : 22.4 L of nitrogen at S.T.P and 5.6 L of oxygen at S.T.P contain equal number of molecules .

Reason (R) : Under similar condition of temperature and pressure all gases contain equal number of molecules .

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: D

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16. Assertion: A lighter gas diffuse more rapidly than a heavier gas.

Reason: At a given temperature, the rate of diffusion of a gas is inversely proportional to the square root of its density.

A. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion .

C. Assertion is true but Reason is wrong .

D. Both Assertion and Reason are wrong .

Answer: A

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