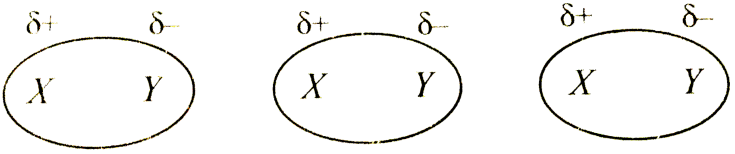
CHEMISTRY

BOOKS - MTG CHEMISTRY (HINGLISH)

STATES OF MATTER

Intermolecular Forces

1. Study the figures below and identify the type of interaction between XY-XY molecules.



A. Dipole - Induced dipole

B. Dipole - Dipole

C. Dispersion forces

D. Induced dipole - Induced dipole.

Answer: B

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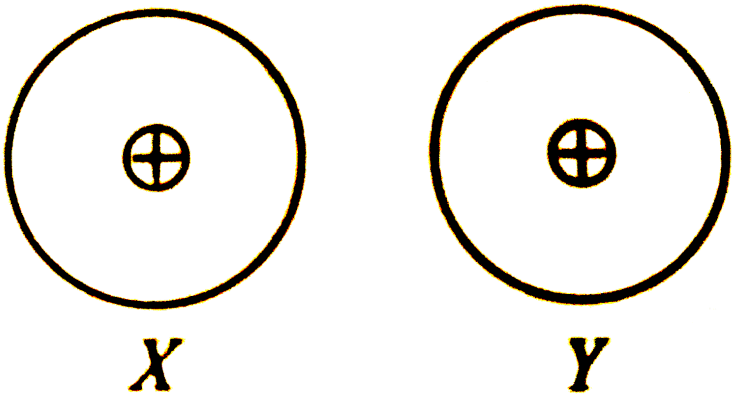
2. Two atoms X and Y are non - polar and electrically symmetrical.



What type of intermolecular forces of attraction can be developed between them ?

A. Dipole - induced dipole forces

B. London forces or dispersion forces

C. Dipole - dipole forces

D. No forces of any kind.

Answer: B

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3. Which of the following molecule is polar and non-planar

A. dipole - dipole forces

B. hydrogen bonds

C. dipole - induced dipole forces

D. dispersion forces.

Answer: C

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4. Statement-1 : Boiling point of H_2O is more than HF

.

and

Statement-2 : Intermolecular hydrogen bonding in HF is stronger than H_2O.

A. H - F has highest van der Waals forces and dipole moment.

B. H - F has highest London forces.

C. H - F has highest dipole moment hence has dipole - dipole , London forces and hydrogen bonding.

D. H - F has strong intermolecular interactions like dipole - induced dipole.

Answer: C

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Intermolecular Forces Vs Thermal Interactions

1. What is the effect on chemical properties and physical properties of water when temperature is changed ?

A. Chemical properties of water remain same but the physical state changes with change in temperature.

B. Chemical properties of water change with change in temperature but physical properties remain same.

C. There is no effect on chemical or physical properties of water when temperature is changed.

D. Both chemical and physical properties of water change with change in temperature.

Answer: A

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2. What is the relationship between thermal energy and intermolecular interaction energy of a substance in three states in terms of X and Y?

$$\text{Gas} \rightarrow \quad \text{Liquid} \rightarrow \quad \text{Solid}$$

$$\xrightarrow{\text{Predominance of X}}$$

$$\xleftarrow{\text{Predominance of Y}}$$

A. X - Thermal energy , Y - Intermolecular interactions

B. X - Thermal energy , Y - Thermal energy

C. X - Intermolecular interactions, Y - Thermal energy

D. X - Intermolecular interactions, Y - Intermolecular interactions

Answer: C

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1. Which of the following does not express the properties of gases ?

A. Gases are highly compressible.

B. Gases exert pressure equally in all directions .

C. Gases have much higher density then liquids and solids .

D. Gases mix evenly and completely in all proportions.

Answer: C

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The Gas Laws

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

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

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

C. PV = RT

D. PV = nRT

Answer: B

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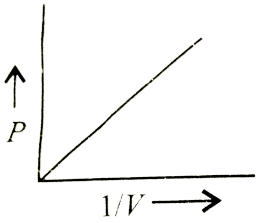
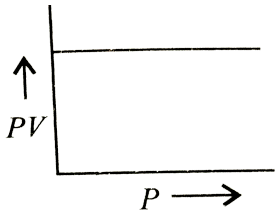
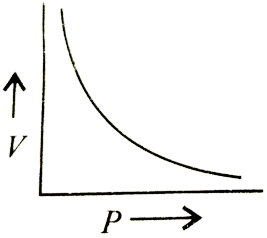
2. Which of the following graphs represents the correct Boyle's law ?



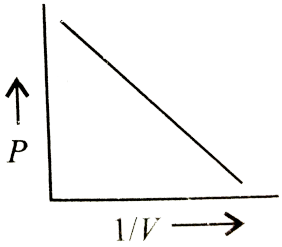
(i)



(ii)



(iii)



(iv)

A. (i) , (ii) and (iii)

B. (i) and (iv)

C. (ii) and (iii)

D. (i) , (ii) and (iv)

Answer: A

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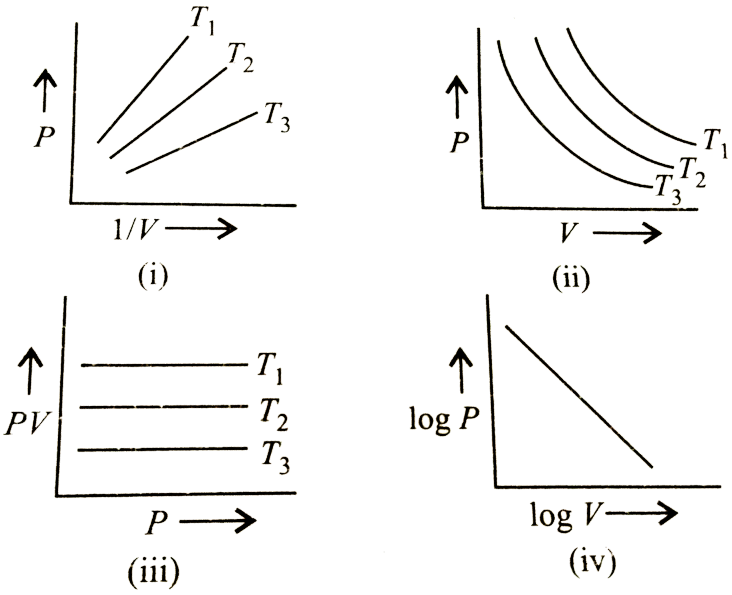
3. Graphs between pressure and volume are plotted at different temperatures . Which of the following isotherms represent Boyle's law as PV = constant ?

$(T_1 > T_2 > T_3)$



A. Only (ii) is correct representation of Boyle's law

.

B. Only (iv) is correct representations of Boyle's law .

C. All are correct representations of Boyle's law.

D. None of these representations is correct for Boyle's law.

Answer: C

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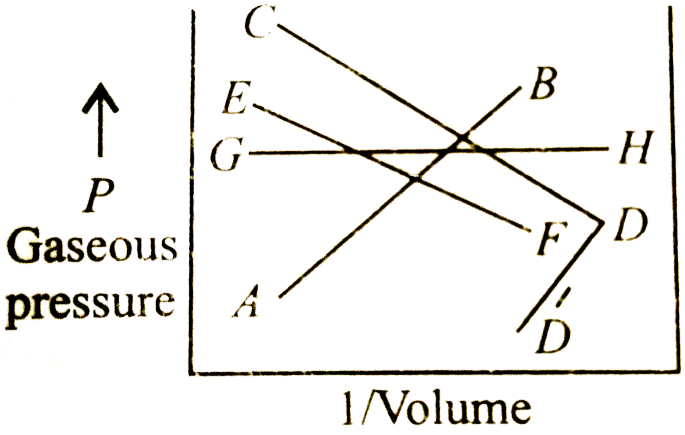
4. Which one of the given pressure versus volume plots represents Boyle's law ?



A. Line AB

B. Line CD

C. Line EF

D. Line GH

Answer: A

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5. What is the effect on the pressure of a gas if its temperature is increased at constant volume ?

A. The pressure of the gas increases.

B. The pressure of the gas decreases .

C. The pressure of the gas remains same .

D. The pressure of the gas remains same .

Answer: A

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6. A flask of capacity 2 L is heated from $35C^\circ$ to $45C^\circ$. What volume of air will escape from the flask ?

A. 10 mL

B. 20 mL

C. 60 mL

D. 50 mL

Answer: C

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7. Which of the following relationships for various gas laws is not correct ?

A. $V_t = V_0 + \frac{V_0}{273} \times t$

B. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ (constant P)

C. $\frac{P_1}{T_1} = \frac{P_2}{T_2}$ (constant V)

D. $\frac{P_1T_1}{V_1} = \frac{P_2T_2}{V_2}$

Answer: D

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8. Which of the following statement does not describe Charles' law ?

A. The volume of a given amount of a gas at constant pressure varies directly at its absolute temperature .

B. For each degree change in temperature , the volume of a sample of a gas changes by the fraction $\frac{1}{273}$ of its volume at $0.^{\circ} C$.

C. All gases expand or contract by the same fraction of their volume at $0.^{\circ} C$ per degree change in temperature .

D. $V_t = V_0\left(\frac{273 - t}{273}\right)$

Answer: D

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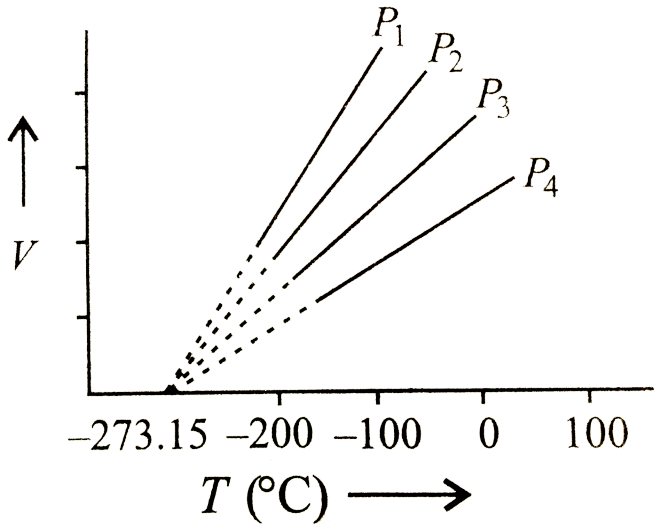
9. Study the following graph and mark the incorrect statement following it .



A. At zero volume all lines meet at $-273.15^{\circ} C$. This temperature is known as absolute zero .

B. Each line of the volume vs temperature at constant pressure of graph is called isotherm .

C. All gases obey Charles' law at very low pressure and high temperature .

D. Pressure remaining constant , volume of a gas is directly proportional to its absolute temperature .

Answer: B

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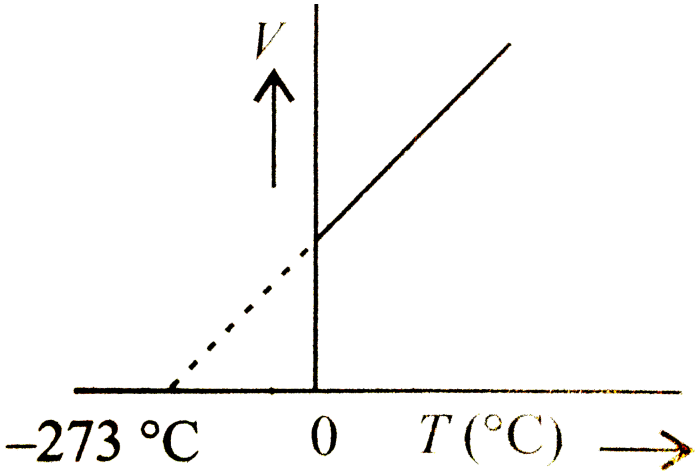
10. If we plot volume of a certain mass of a gas against temperature at constant pressure , we get a straight line intersecting on the negative side at

$-273.^{\circ} C$ which explains about absolute zero . This graph is know as



A. isochor

B. isotherm

C. isotone

D. isobar .

Answer: D

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11. Absolute zero is defined as the temperture

A. pressure becomes zero

B. volume become zero

C. mass become zero

D. density become zero .

Answer: B

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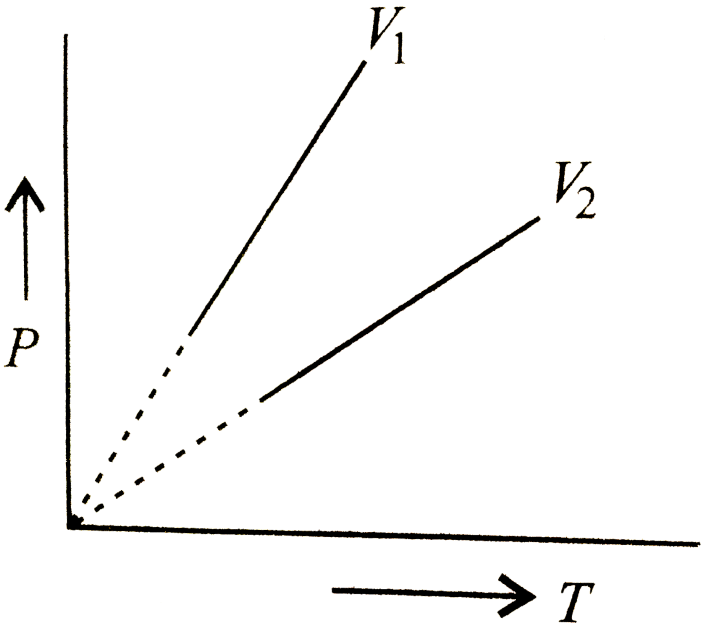
12. A plot of P vs T for a given mass of gas at constant volume is a straight line . P vs T at constant volumes V_1 and V_2 for an ideal gas are shown below :

Which of the following is correct ?



A. $V_1 > V_2$

B. $V_1 < V_2$

C. $V_1 = V_2$

D. $V_1 = 2V_2$

Answer: B

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13. At NTP the volume of a gas is 40 mL . If pressure is increased to 800 mm of Hg at the same temperature what will be the volume of the gas ?

A. 38 mL

B. 22400 mL

C. 240 mL

D. 431 mL

Answer: A

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14. Volume of a given mass of gas at 17 °C is measured as $200cm^3$. The volume of the same mass of gas at same pressure and temperature of 47°C will be ?

A. $77.5cm^3$

B. $13.45cm^3$

C. $220.6cm^3$

D. $320cm^3$

Answer: C

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15. An open flask contains air at $27^\circ C$ Calculate the temperature at which it should be heated so that (a) $\frac{1}{3}$ rd of air measured at $27^\circ C$ escapes out

A. $177.^\circ C$

B. $100.^\circ C$

C. $300.^\circ C$

D. $150.^\circ C$

Answer: A

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Mcqs

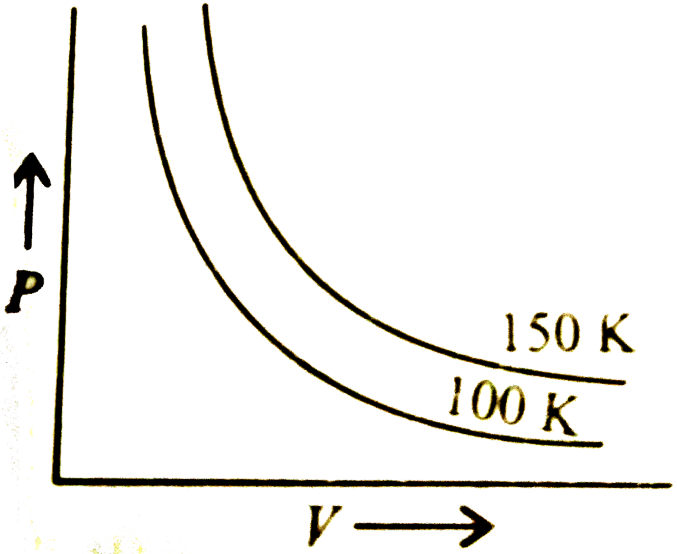
1. A graph is plotted between pressure and volume at different temperatures . On the basis of the graph what changes will you observe in the volume if

(i) the pressure is increased at constant temperature

.

(ii) the temperature is decreased at constant

pressure .



A. volume increases in both the cases

B. volume decrease in both the cases

C. volume increase in (i) and decreases (ii)

D. volume decreases in (i) and increases in (ii) .

Answer: B

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2. Given below are the critical temperatures of a few gases . When the gases are started cooling , which gas will liquefy first and which will liquefy in the end ?

Gas	T_c/K
N_2	126.0
CO_2	304.10
NH_3	405.5
O_2	154.3

A. N_2 will liquefy first and NH_3 at last .

B. NH_3 will liquefy first and CO_2 at last .

C. NH_3 will liquefy first and N_2 at last .

D. CO_2 will liquefy first and NH_3 at last .

Answer: C

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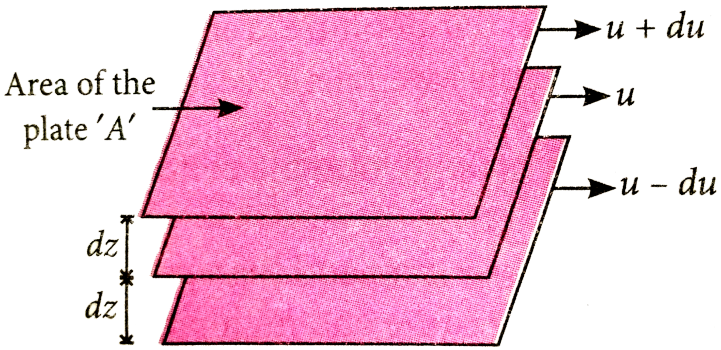
3. The figure



helps to establish the relationship between force and

A. area of contact

B. velocity gradient

C. coefficient of viscosity

D. both (a) and (b) .

Answer: D

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Ideal Gas Equation

1. The relations between various variables of gaseous substances are given along with their formulae .

A. Density and molar mass : $M = \frac{dRT}{P}$

B. Universal gas constant , P , V , T : $R = \frac{PV}{nT}$

C. Volume and pressure : $V_2 = \frac{P_2 V_1}{P_1}$

D. Volume and temperature : $V_2 = \frac{V_1 T_2}{T_1}$

Answer: C

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2. Which of the following values does not represent the correct value of R ?

A. 8.314 Pa $m^3 K^{-1} mol^{-1}$

B. $8.314 \times 10^2 \text{bar} \quad LK^{-1} mol^{-1}$

C. $0.0821 jk^{-1} mol^{-1}$

D. $8.314 jk^{-1} mol^{-1}$

Answer: C

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3. The correct value of the gas contant R is close to

A. 0.082 litre- atmosphere K

B. 0 . 082 litre - atmosphere $K^{-1} mol^{-1}$

C. 0.082 litre - $\text{atmosphere}^{-1} K mol^{-1}$

D. 0.082 $\text{litre}^{-1} \text{atmosphere}^{-1}$ K mol.

Answer: B

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4. Value of gas constant R in the ideal gas equation PV = nRT depends upon

A. temperature of the gas

B. pressure of the gas

C. units in which P , V and T are measured

D. nature of the gas .

Answer: C

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5. 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. P / RT

C. PRT

D. RT / P

Answer: B

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6. Ideal gas equation is also called equation of states bacause

A. it depends on states of matter

B. it is a relation between four variables and describes the state of any gas

C. it is combination of various gas laws and any variable can be calculated

D. it is applicable to only ideal gases under STP conditions .

Answer: B

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7. At what temperature 28 g of N_2 will occupy a volume of 20 litres at 2 atm ?

A. 300.0 K

B. 487.2 K

C. 289.6 K

D. 283.8 K

Answer: B

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8. There is a standard value of temperature and pressure at which the molar of a gas is 22.4 L . The correct values are

A. 273 K atm

B. 300 K , 760 mm

C. $25C^\circ$, 760 mm

D. 373 K , 1 atm

Answer: A

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9. $4.4 g of CO_2$ and $2.24 \text{litre of} H_2$ at STP are mixed in a container. The total number of molecules present in the container will be:

A. 9.9

B. 0.099

C. 0.001

D. 1.00

Answer: B

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

A. 22.4 L

B. 44.8 L

C. 12.2 L

D. 2.24 L

Answer: D

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11. Weight of CO_2 in a 10 L cylinder at 5 atm and $27^\circ C$ is

A. 200 g

B. 224 g

C. 44 g

D. 89.3 g

Answer: D

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12. The volume occupied by 88 g of CO_2 at $30.^\circ C$ and 1 bar pressure will be

A. 5.05 L

B. 49.8 L

C. 2 L

D. 55 L

Answer: B

13. If 4 moles of an ideal gas at 300 K occupy volume of 89 . 6 L , then pressure of the gas will be

A. 2 atm

B. 1 atm

C. 1.099 atm

D. 2.910 atm

Answer: C

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

A. 2.5 L

B. 4 L

C. 3.5 L

D. 3 L

Answer: D

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15. Molecular mass of a gas is 78 . Its density at $98^\circ C$ and 1 atm will be

A. $200gL^{-1}$

B. $2.56gL^{-1}$

C. $256gL^{-1}$

D. $78gL^{-1}$

Answer: B

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16. 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. 0 . 82 atm

B. 8314×10^4 atm

C. 1 atm

D. 1.8 atm

Answer: A

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17. A closed container contains equal number of moles of two gases X and Y at a total pressure of 710 mm of Hg . If gas X is removed from the mixture , the pressure will

A. become double

B. become half

C. remains same

D. become one - fourth .

Answer: B

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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. $124.77gmol^{-1}$

B. $1247.74gmol^{-1}$

C. $12.47gmol^{-1}$

D. $30gmol^{-1}$

Answer: B

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19. At 1 atmospheric pressure and $0.^{\circ} C$, certain mass of a gas measures $0.4L$. Keeping the pressure constant , if the temperature is increased is increased to $273.^{\circ} C$, what will be its volume ?

A. 0.8 L

B. 22.4 L

C. 54.6 L

D. 0.4 L

Answer: A

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

A. 204 mL

B. 200 mL

C. 203 mL

D. 400 mL

Answer: C

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21. A gas occupies a volume of 300 cm^3 at $27^\circ C$ and 620 mmHg pressure . The volume of gas at $47^\circ C$ and 640 mmHg pressure is

A. $260cm^3$

B. $310cm^3$

C. $390cm^3$

D. $450cm^3$

Answer: B

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22. What is the density of CO_2 at $27.^\circ C$ and 2.5 atm pressure ?

A. $5.2gL^{-1}$

B. $6.2gL^{-1}$

C. $7.3gL^{-1}$

D. $4.46gL^{-1}$

Answer: D

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23. 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. $3.0gdm^{-3}$

B. $5.0gdm^{-3}$

C. $6.0gdm^{-3}$

D. $10.82gdm^{-3}$

Answer: A

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24. In a flask of volume V litres, 0.2 mol of oxygen 0.4 mol of nitrogen, 0.1 mole of NH_3 and 0.3 mol of He are enclosed at $27^\circ C$. If the total pressure exerted by these non reacting gases is one atmosphere, the partial pressure exerted by nitrogen is

A. 0.1 atmosphere

B. 0.2 atmosphere

C. 0.3 atmosphere

D. 0.4 atmosphere

Answer: D

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

A. CO_2 and CO

B. NH_3 and HCI

C. CO_2 and N_2

D. `CH_(4) and C_(2)H_(6)

Answer: B

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26. Which of the following relationships between partial pressure , volume and temperature is correct ?

(i) $P = \frac{nRT}{V}$

(ii) $P_{\text{total}} = P_1 + P_2 + P_3$

(iii) $P_{\text{total}} = (n_1 + n_2 + n_3)\frac{RT}{V}$

A. (i) and (ii)

B. (i) and (iii)

C. (ii) and (iii)

D. (i) , (ii) and (iii)

Answer: D

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27. A $10L$ flask at $298K$ contains a gaseous mixture of CO and CO_2 at a total pressure of 2.0bar if 0.20 mole of CO is present, find its partial pressure and also that of CO_2.

A. 0.49 atm

B. 1.51 atm

C. 1 atm

D. 2 atm

Answer: A

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28. The pressure of a mixture of equal weight of two gases of mol wt. 4 and 40, is 1.1 atm. The partial pressure of the lighter gas in this mixture is

A. 1 atm

B. 0.1 atm

C. 0.15 atm

D. 0.5 atm

Answer: A

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29. If the ration of the masses of SO_3 and O_2 gases confined in a vessel is $1:1$, then the ratio of their partial pressure would be

A. $5:2$

B. $2:5$

C. $2:1$

D. $1:2$

Answer: B

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30. A container of 1 L capacity contains a mixture of 4 g of O_2 and 2 g H_2 at $0^\circ C$. What will be the total pressure of the mixture ?

A. 50.42 atm

B. 25.21 atm

C. 15.2 atm

D. 12 . 5 atm

Answer: B

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31. The correct expression of partial pressure in terms of mole fraction is

A. $p_1 = x_1 p_{\text{total}}, p_2 = x_2 P_{\text{total}}$

B. $P = x_1 x_2 x_2 P_{\text{total}}$

C. $P_{\text{total}} = P_1 x_1, P_{\text{total}} = P_2 x_2$

D. $P_1 + P_2 = x_1 + x_2$

Answer: A

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32. Equal masses of helium and oxygen are mixed in a container at $25C^\circ$. The fraction of the total pressure exerted by oxygen in the mixture of gases is

A. 1/3

B. 2/3

C. 1/9

D. 4/9

Answer: C

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33. A bubble of air is underwater at temperature $15^{\circ}C$ and the pressure 1.5 bar. If the bubble rises to the surface where the temperature is $25^{\circ}C$ and the pressure is 1.0 bar, what will happen to the volume of the bubble?

A. Volume will become greater by a factor of 1.55.

B. Volume will become greater by a factor of 1.1.

C. Volume will become smaller by a factor of 0.70.

D. Volume will become greater by a factor of 2.5.

Answer: A

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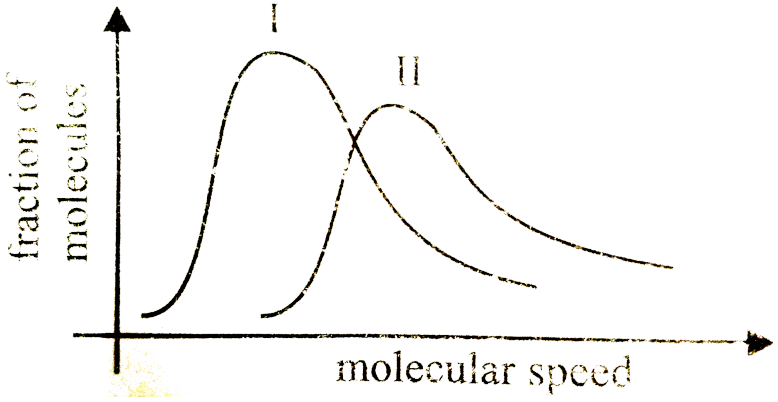
Kinetic Energy And Molecular Speeds

1. The graphs representing distribution of molecular speeds at 300 K for gases CI_2 and N_2 are as show in figure :



Select the correct option .

A. I graph is for N_2 and II is for Cl_2

B. II graph is for N_2 and I is for Cl_2

C. Either graph can be taken for N_2 or Cl_2

D. Information is not sufficient .

Answer: B

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2. Match the columm I with column II and mark the appropriate choice .

Column I		Column II	
(A)	u_{rms}/u_{av}	(i)	1.22
(B)	u_{av}/u_{mp}	(ii)	1.13
(C)	u_{rms}/u_{mp}	(iii)	1.08

A. $(A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (i)$

B. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii)$

C. $(A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (iii)$

D. $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (i)$

Answer: A

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3. At what temperature will the molar kinetic energy of $0.3mol$ of $'He'$ be the same as that of $0.4mol$ of argon at $400K$?

A. 700 K

B. 500 K

C. 800 K

D. 400 K

Answer: D

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4. The rms speed of N_2 molecules in a gas in u. If the temperature is doubled and the nitrogen molecules dissociate into nitrogen atom, the rms speed becomes

A. u / 2

B. 2u

C. 4u

D. 12u

Answer: B

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Kinetic Molecular Theory Of Gases

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

A. Gases consist of particles which are in continuous , random motion .

B. The particles are infinitely small and very close to each other.

C. The collisions of the particles with each other are elastic .

D. The pressure of a gas is caused by the collisions of gas particles with the wall of the container .

Answer: B

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2. At any particular time , different particles in the gas

A. have same speed and kinetic energy

B. have same speed but different kinetic energies

C. have different speeds nut same kinetic energy

D. have different speeds and hence different kinetic energies .

Answer: D

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3. The kinetic theory of gases presumes the collisions between the molecules to be perfectly elastic because

A. occur in a zig - zag path

B. occur in a straight line

C. change velocity and energy

D. result in settling down of molecules.

Answer: B

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4. Which of the following assumptions is incorrect according to kinetic theory of gases ?

A. Particles of a gas move in all possible directions in straight lines .

B. All the particles , at any particular time , have same speed and same kinetic energy .

C. There is no force of attraction between the particles of a gas at ordinary temperature and pressure .

D. The actual volume of the gas is negligible in comparison to the empty space between them .

Answer: B

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Behaviour Of Real Gases

1. A gas that follows Boyle's law, Charle's law and Avogadro's law is called an ideal gas. Under what conditions a real gas would behave ideally ?

A. Under low pressure and temperature

B. Under high pressure and temperature

C. Under high pressure and low temperature

D. Under low pressure and high temperature

Answer: D

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2. The main reason for deviation of gases from ideal behaviour is few assumptions of kinetic theory . These are

(i) there is no force of attraction between the molecules of a gas

(ii) volume of the molecules of a gas is negligibly small in comparison to the volume of the gas

(iii) particles of a gas are always in constant random motion .

A. (i) and (ii)

B. (ii) and (iii)

C. (i) , (ii) and (iii)

D. (iii) only

Answer: A

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3. The molecules of a gas are in constant (i) _____ motion . They move in (ii) _____ lines until they

collide with another molecule . The collisions are perfectly (iii) _____ in nature . A real gas behaves as an ideal gas at (iv) _____ temperature and (v) _____ pressure .

A. (i) random (ii) vertical (iii) straight (iv) high (v) low

B. (i) straight (ii) random (iii) elastic (iv) low (v) high

C. (i) random (ii) straight (iii) elastic (iv) high (v) low

D. (i) ideal (ii) round (iii) elastic (iv) low (v) high

Answer: C

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4. Match the column I with column II and mark the appropriate choice .

Column I		Column II	
(A)	$P = p_1 + p_2 + p_3 + ...$	(i)	Boyle's law
(B)	$P_1V_1 = P_2V_2 = P_3V_3 = ...$	(ii)	Ideal gas equation
(C)	$(V-b)\left(P+\frac{a}{V^2}\right) = RT$	(iii)	Dalton's law of partial pressure
(D)	$PV = nRT$	(iv)	Equation for real gases

A.

$$(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iv), (D) \rightarrow (iii)$$

B.

$$(A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (iv), (D) \rightarrow (ii)$$

C.

$(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (i), (D) \rightarrow (iv)$

D. $(A) \rightarrow (iv), (B) \rightarrow (ii), (C) \rightarrow (iii), (D)(i)$

Answer: B

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

A. (V - b)

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

C. RT

D. PV

Answer: B

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6. Which of the following expressions represents the value and unit of van der Waals constant a?

A. $a = \frac{V}{n}, \quad \mathrm{L\,mol^{-1}}$

B. $a = \frac{PV}{n}, \mathrm{atm\ L^2 mol^{-1}}$

C. $a = \frac{PV^2}{n^2}, \mathrm{atm\ L^2 mol^{-1}}$

D. $a = \frac{P}{n}, \quad \text{atm mol}^{-1}$

Answer: C

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7. van der Waals constant b in corrected equation for real gases represents

A. measure of effective size of gas molecules

B. magnitude of attractive forces among gas molecules

C. free volume of the molecules

D. difference in pressure and volume of gas molecules.

Answer: A

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8. In the corrections made to the ideal gas equation for real gases, the reduction in pressure due to attractive forces is directly proportional to :

A. $\frac{n}{V}$

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

C. V - nb

D. nb

Answer: B

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9. A real gas obeying van der Waal equation will resemble ideal gas if the

A. constants a and b both are small

B. a is large and b is small

C. a is small and b is larger

D. constants a and b both are large .

Answer: A

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10. The van der Waal equation of gas is

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

A. (i) CO_2 , (ii) H_2

B. (i) CH_4 , (ii) CO_2

C. (i) H_2 , (ii) CO_2

D. O_2, (ii) H_2

Answer: A

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11. For a real gas , the compressibility factor Z has different values at different temperatures and pressures . Which of the following is not correct under the given conditions ?

A. Z lt 1 at very low pressure .

B. Z gt 1 at high pressure .

C. Z = 1 under all conditions .

D. Z = 1 at intermediate pressure

Answer: C

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12. Under what conditions to gases show maximum deviations from ideal gas behavior ?

A. At high temperature and low pressure

B. At low temperature and high pressure

C. At high temperature and high pressure

D. At low temperature and low pressure

Answer: B

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13. Compressibility factor of a gas is given by the equation $Z = \frac{PV}{nRT}$. On this basis , mark the correct statement.

A. When Z $>$ 1 , real gases get compressed easily .

B. When Z = 1 real gases get compressed easily .

C. When Z $>$ 1 , real gases are difficult to compress .

D. When Z = 1 , real gases are difficult to compress .

Answer: C

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14. At Boyle's temperature , compressibility factor Z for a real gas is

A. 1

B. 0

C. > 1

D. < 1

Answer: A

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15. It is observed that H_2 and He gases always show positive deviation from ideal behaviour i.e ., $Z > l$. This is because

A. the value of a is very large due to high attractive forces

B. the weak intermolecular forces of attraction due to which a is very small and $\frac{a}{V^2}$ is negligible

C. the value of b is very large due to large size of the molecules

D. both a and b are very small and negligible .

Answer: B

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Liquification Of Gases

1. An ideal gas , obeying kinetic theory of gases cannot be liquefied, because :-

A. it solidifies before becoming a liquid

B. forces acting between its molecules are negligible

C. its critical temperature is above $0.^{\circ} C$

D. its molecules are relatively small in size.

Answer: B

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2. What are the most favourble conditions to liquefy a gas ?

A. High temperature and high pressure

B. Law temperature and high pressure

C. Low temperature and low pressure

D. High temperature and low pressure

Answer: B

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3. It is easier to liquify ammonia than oxygen because

A. it is easier to compress oxygen than NH_3

B. NH_3 has a very low critical temperature as compared to O_2

C. O_2 has a higher value of der Waals constant a and higher critical temperature than NH_3

D. NH_3 has a higher value of van der Waals constant a and higher critical temperature than oxygen .

Answer: D

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4. Read the following statements and identify the incorrect statement .

A. Volume of one mole of a gas at critical temperature is called molar volume .

B. Pressure of a gas at critical temperature is called critical pressure .

C. The critical temperature , pressure and volume are called critical constants .

D. Critical temperature is the highest temperature at which a gas can exist as liquid , above this temperature it is a gas .

Answer: A

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1. Liquids are similar to gases because

A. both possess the property of flowing and take the volume of the containers

B. both diffuse and take the shape of the containers

C. both are readily compressible and diffuse

D. both are capable of infinite expansion .

Answer: B

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2. Which of the following does not decrease with rise in temperature ?

A. Density

B. Surface tension

C. Vapour pressure

D. Viscosity

Answer: C

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3. Vapour pressure of a liquid decreases with increase in .....

A. decrease in temperature

B. increase in temperature

C. increase in surface area

D. increase in volume .

Answer: B

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4. At high altitudes, water boils at a lower temperature because

A. the atmospheric pressure is high at high altitudes

B. the viscosity of water is reduced at altitudes

C. the atmospheric pressure is low at high altitudes

D. the surface tension of water is reduced at high altitudes .

Answer: C

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5. Which of the following phenomena does not involve surface tension ?

A. Mercury drops acquire spherical shape .

B. Liquids tend to rise in the capillary .

C. A liquids flows over a fixed surface .

D. Moist soil grains are pulled together .

Answer: C

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6. Surface tension does not vary with

A. temperature

B. concentration

C. size of the surface

D. vapour pressure .

Answer: C

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7. Which of the following has highest surface tension ?

A. Water

B. Soap solution in water

C. Detergent solution in water

D. Glycerol in water

Answer: D

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8. Which of the following is not a correct expression regarding the units of coefficient of viscosity ?

A. dyne $cm^{-2}s$

B. dyne $cm^{2}s^{-1}$

C. N $m^{-2}s$

D. Pa s

Answer: B

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9. Mark the correct statement for viscosity .

A. Greater the viscosity , more slowly the liquid flows .

B. Viscosity increases with increase in temperature .

C. Hydrogen bonding and van der Waals forces decrease the viscosity .

D. Viscosity is the measure of ease with which a liquid flows .

Answer: A

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10. Pick out the wrong statement (s).

(i) Vapour pressure of a liquid is the measure of the strength of intermolecular attractive forces .

(ii) Surface tension of a liquid acts perpendicular to

the surface of the liquid .

(iii) Vapour pressure of all liquids is same at their freezing points .

(iv) Liquids with stronger intermolecular attractive forces are more viscous than those with weaker intermolecular force .

A. (ii) , (iii) and (iv)

B. (ii) and (iii)

C. (i) , (ii) and (iii)

D. (iii) only

Answer: D

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Higher Order Thinking Skills

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

A. 1.8 bar

B. 2.8 bar

C. 3.0 bar

D. 5 bar

Answer: A

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2. A2 litre vessel is filled with air at $50^{\circ}C$ and pressure of 3 atm. The temperature is now raised to $200^{\circ}C$ A valve is now opened so that the pressure inside drops to one atm What fraction of the total number of moles, inside escaped on openig the valve ? Assume no change in the volume of the container .

A. 7.7

B. 9.9

C. 8.9

D. 0.77

Answer: D

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3. A mixture in which the mole ratio of H_2 and O_2 is $2:1$ is used to prepare water by the reaction.

$$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$$

The total pressure in the container is $0.8atm$ at $20^\circ C$ before the reaction. Determine the final pressure at $120^\circ C$ after reaction assuming $80\,\%$ yield of water.

A. 1.787 atm

B. 0.878 atm

C. 0.787 atm

D. 1.878 atm

Answer: C

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

A. $4:1$

B. $1:4$

C. $1:8$

D. $2:8$

Answer: B

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5. A mixture of dihydrogen and dioxygen at one bar pressure contains 20% by weight of dihydrogen . What would be the partial pressure of dihydrogen in bar ?

A. 0.8

B. 1.8

C. 2.8

D. 3

Answer: A

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6. Certain volume of a gas exerts on its walls some pressure at a particular temperature . It has been found that by reducing the volume of the gas to half of its original value the pressure become twice that

of the initial value at constant temperature . this happens because

A. mass of the gas increases with pressure

B. speed of the gas molecules decreases

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

D. gas molecules attract each other .

Answer: C

View Text Solution

7. If volume occupied by CO_2 molecules is negligible, then calculate pressure $\left(\frac{P}{5.277}\right)$ exerted by one mole of CO_2 gas at $300K$. $\left(a = 3.592 atm L^2 mol^{-2}\right)$

A. 7

B. 8

C. 9

D. 3

Answer: B

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8. The compressibility factor $(Z = PV/nRT)$ for N_2 at $223K$ and $81.06MPa$ is 1.95, and at $373K$ and $20.265MPa$, it is 1.10. A certain mass of N_2 occupies a volume of $1.0dm^3$ at $223K$ and $81.06MPa$. Calculate the volume occupied by the same quantity of N_2 at $373K$ and $20.265MPa$.

A. $3.774dm^3$

B. $2.77dm^3$

C. $5.07dm^3$

D. $9.30dm^3$

Answer: A

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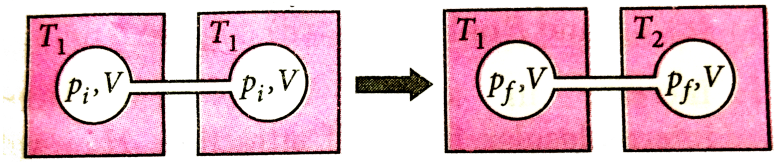
Hots Higher Order Thinking Skills

1. Two closed bulbs of equal volume (V) containing an ideal gas initially at pressure P_i and temperature T_1 are connected through a narrow tube of negligible volume as shown in the figure below . The temperature of one of the bulbs is then raised to T_2 . the final pressure Pf is



A. $P_i\left(\frac{T_1T_2}{T_1+T_2}\right)$

B. $2P_i\left(\frac{T_1}{T_1+T_2}\right)$

C. $2P_i\left(\frac{T_2}{T_1+T_2}\right)$

D. $2P_i\left(\frac{T_1T_2}{T_1+T_2}\right)$

Answer: C

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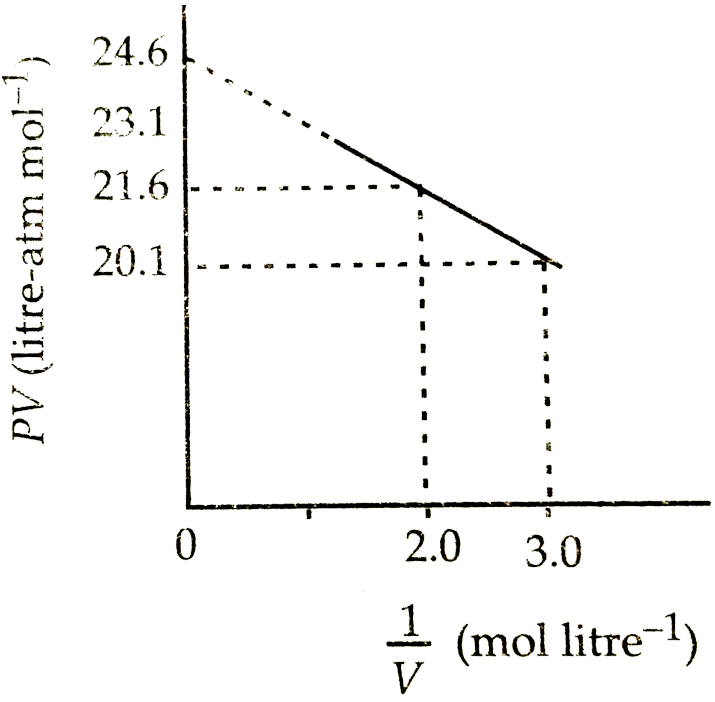
2. For one mole of a van der Waals gas when b = 0 and T = 300 K , the PV vs 1/V plot is shown below . The value of the van der Waals constant a (atm

litre$^2 mol^{-2}$) is



A. 1.0

B. 4.5

C. 1.5

D. 3.0

Answer: C

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Ncert Exemplar

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 increase

B. temperature decreases

C. pressure decreases

D. temperature increases.

Answer: C

Watch Video Solution

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 phenomene

D. Pressure

Answer: B

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3. 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 diploes in the particles .

Answer: C

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4. 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

Watch Video Solution

5. 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

6. 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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7. 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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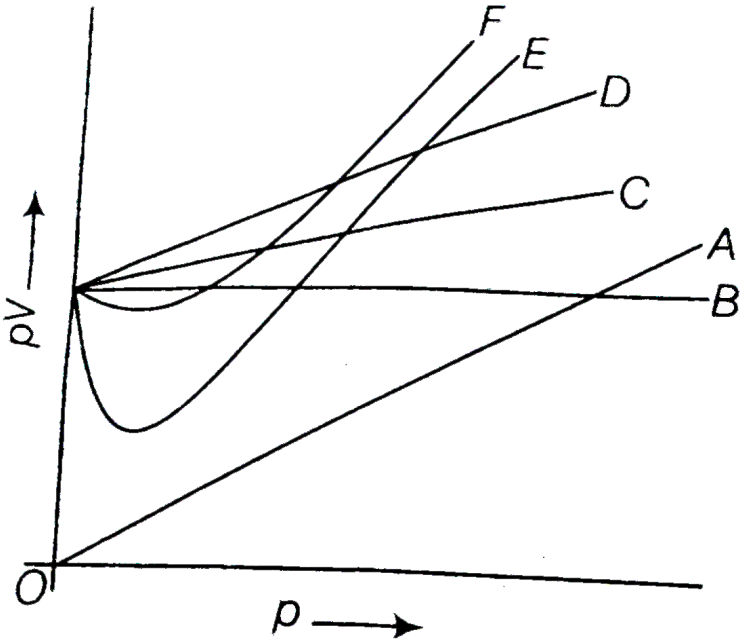
8. Which curve in figure represents the curve of ideal gas ?



A. B only

B. C and D only

C. E and F only

D. A and B only

Answer: A

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

A. Increase

B. No effect

C. Decrease

D. No regular pattern will be followed .

Answer: C

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10. 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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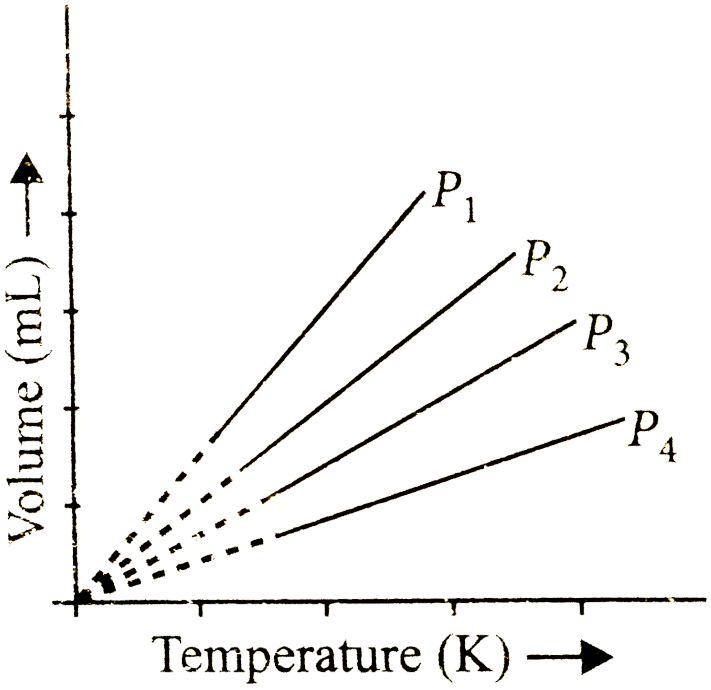
Ncert Exemplar Problems

1. 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. $P_1 = P_2 P_2 = P_3 = P_4$

C. $P_1 < P_2 < P_3 < P_4$

D. $P_1 < P_2 = P_3 < P_4$

Answer: C

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2. Atmospheric pressures recorded in different cities 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 and mark the place at which liquid will boil first .

A. Shimla

B. Bangalore

C. Delhi

D. Mumbai

Answer: A

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Assertion And Reason

1. Assertion : Dipole - dipole forces acting between the molecules possessing permanent dipole , are weaker than ion - ion interactions .

Reason : The attractive forces decrease with the increase of distance between the dipoles .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: B

View Text Solution

2. Assertion : Liquids and solids are hard to compress .

Reason : Magnitude of the repulsive forces between the molecules rises very rapidly as the distance separating the molecules decreases .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: A

View Text Solution

3. Assertion : Gases become denser at high pressure .

Reason : At high pressures , gases deviate from Boyle's law .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of

assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: B

View Text Solution

4. Assertion : The lowest hypothetical or imaginary temperature at which gases are supposed to occupy zero volume is called absolute zero .

Reason : Volume of the gas at $-273.15C^{\circ}$ becomes zero i.e. gas does not exist at this temperature .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: A

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5. Assertion : At constant temperature PV vs P plot for real gases is not a straight line .

Reason : In the curves of dihydrogen and helium , as the pressure increases the value of PV also increases .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: B

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6. Assertion : Molar volume of an ideal gas at 273 . 15 K and 1 bar is 22.4 L.

Reason : Volume of a gas is inversely proportional to temperature .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of

assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: D

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7. Assertion : In Maxwell - Boltzmann distribution of speeds , the curve broadens at higher temperature .

Reason : At a particular temperature , the individual speed of molecules as well as the distribution of speeds remains the same .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: C

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8. Assertion : The gases show ideal behaviour when the volume occupied is large so that the volume of the molecules can be neglected in comparison to it .

Reason : The behaviour of the gas becomes more ideal when pressure is very low .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: B

View Text Solution

9. Assertion : Compressibility factor (Z) is the ratio of actual molar volume of a gas to the molar volume of it , if it were an ideal gas at that temperature and pressure .

Reason : At high pressure all the gases have Z lt 1 and can be easily compressed .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: C

View Text Solution

10. Assertion :- On cooling ,ammonia lirquifies first whereas CO_2 requires more cooling.

Reason :- Critical temperatures of ammonia and carbon dioxide are 405.5 K and 304.10 K respectively.

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: A

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11. Assertion : All the gases should be cooled below their critical temperature for liquification .

Reason : Cooling slows down the movement of molecules therefore , intermolecular forces may hold the slowly moving molecules together and the gas liquifies .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: B

View Text Solution

12. Assertion : At high altitudes , liquids boil at lower temperatures in comparison to that at sea level .

Reason : At high altitudes , atmospheric pressure is low .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: A

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13. Assertion : The normal boiling point of water is $100C^\circ$ and standard boiling point of water is $99.6C^\circ$.

Reason : The temperature at which vapour pressure of liquid is equal to the external pressure is called boiling temperature at that pressure .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: B

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14. Assertion : Viscosity of liquids decreases as the temperature rises .

Reason : At high temperature , molecules have high kinetic energy and can overcome the intermolecular forces to flow faster .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: A

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15. Assertion : Windowpanes of old building become thicker at the bottom than at the top .

Reason : Glass is an extremely viscous liquid .

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion .

C. If assertion is true but reason is false .

D. If both assertion and reason are false .

Answer: A

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