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NEET
Chemistry

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States of Matter

Daily Practice Problems

Solutions

Question 1.

The two gas cylinders having same capacity have been filled with 54g of H_2 and 44g of CO_2 respectively. If the pressure in the cylinder of CO_2 is 1 atm at a particular temperature, the pressure in the hydrogen cylinder at the same temperature: [Level: Moderate]

(a) 17

(b) 27

(c) $P_{H_2} = P_{Co_2}$

(d) 1 atm

Answer.

Correct option is (b) 27

Given,

Weight of H_2 in Cylinder is 54g

Moles of $H_2 = \frac{54}{2} = 27$

Weight of CO_2 in Cylinder is 54g

Moles of $CO_2 = \frac{44}{44} = 1$

Thus, pressure in cylinder of H_2 = 27 times the pressure in CO_2 cylinder i.e, 27 atm

Question 2.

Calculate the volume of 0.250 mol of an ideal gas at 75^0C and 0.821 atm pressure. [Level: Easy]

(a) 8.95L

(b) 98.5L

(c) 89.5L

(d) 10.5L

Answer.

Correct option is (c). 89.5L

Given,

Pressure (P) = 0.821

Moles (n) = 0.250

Temperature(t) = 358

PV = nRT

V = $\frac{nRT}{P}$

V = $\frac{0.250 \times 0.821 \times 358}{0.821}$

V = $89.5L$

Question 3.

A density gaseous oxide with 4 bar pressure at 0^0C is similar to the density of SO_2 at 5 bar, the molecular mass of the oxide is – [Level: Moderate]

(a) 44g

(b) 72g

(c) 70g

(d) 32g

Answer.

Correct option is (c) 70g

Given,

Pressure of gaseous oxide = 4 bar

Pressure of SO_2 = 5 bar

Let, d_1 = density of gases oxide

d_2 = density of gases oxide

d = $\frac{PM}{RT}$

$d_1 = \frac{4 \times M}{RT}$

$d_2 = \frac{5 \times 64}{RT}$

$d_1 = d_2$

$\frac{4 \times M}{RT} = \frac{5 \times 64}{RT}$

$M = 70g$

Question 4.

Unit of viscosity is [Level: Easy]

(a) dynes $cm^{-2}sec$

(b) dynes $cm^{-1}sec^{-2}$

(c) dynes $cm^{-1}sec^{-1}$

(d) dynes $cm^{2}sec^{-1}$

Answer.

Correct option is (a) dynes cm^{-2} sec

$\eta = \frac{F.dx}{A.dv}$

$\eta = \frac{Dynes \times cm}{Cm2 \times cm/sec}$

η = dynes cm^{-2} sec

Question 5.

At which temperature average velocity of Nitrogen molecule is equal to the rms velocity at 47^0C? [Level: Difficult]

(a) 97.2^0C

(b) 403K

(c) 103.7^0C

(d) 40^0C

Answer.

Correct option is (c) 103.7^0C

We know that,

Average velocity = $\sqrt{\frac{8RT}{\pi M}}$

rms velocity = $\sqrt{\frac{3RT}{M}}$

According to question -

$\sqrt{\frac{3RT}{M}} = \sqrt{\frac{8RT}{\pi M}}$

$\sqrt{\frac{3 \times R \times 320}{M}} = \sqrt{\frac{8 \times R \times T}{\pi M}}$

$\frac{3 \times R \times 320}{M} = \frac{8 \times R \times T}{\pi M}$

$\frac{3 \times 320 \times 3.14}{8} = 376.2\text{K}$

$= 103.7^0\text{C}$

Question 6.

Calculate the temperature at which 32g of O_2 will occupy a volume of 10.0 L at 3.16 atm. [Level: Easy]

(a) 273.1k

(b) 384.8K

(c) 348.6K

(d) 117^0C

Answer.

Correct option is (b) 384.8K

$32\text{g of } O_2 = 1 \text{ mole of } O_2$

$\text{PV} = \text{nRT}$

3.16 X 10 = 1 X 0.0821 X T

T = 384.8K

Question 6.

Diffusion rate between methane and ammonia is – [Level: Moderate]

(a) Ammonia < Methane

(b) Ammonia > Methane

(c) Ammonia = Methane

(d) Diffusion will not take place

Answer.

Correct option is (a) Ammonia < Methane

Molecular mass of Ammonia is 17g

Molecular mass of Methane is 16g

We know that,

Rate $\propto \sqrt{\frac{1}{M}}$

So,

Methane gas has a faster rate of diffusion than ammonia.

Question 7.

A temperature above which gas shows heating effect and below that temperature gas shows cooling effect that temperature is – [Level: Easy]

(a) Boyles Temperature

(b) Inversion Temperature

(c) Critical Temperature

(d) None of these

Answer.

Correct option is (b) Inversion Temperature

Inversion Temperature is definite temperature at which the ***gas shows neither heating effect nor cooling effect*** when allowed to expand adiabatically, above this temperature gas shows heating effect and below this temperature gas shows cooling effect.

Question 8.

The density of neon will be highest at [Level: Easy]

(a) STP

(b) 0^0C, 2atm

(c) 273^0C, 1atm

(d) 273^0C, 2atm

Answer.

Correct option is (b) 0^0C, 2atm

d = $\frac{PM}{RT}$

Higher the pressure lowers the temperature greater is the density

Question 9.

The pressure and temperature of 5 dm^3 of CO_2 gas are tripled. Then the volume of CO_2 gas would be [Level: Moderate]

(a) 2 dm^3

(b) 3 dm^3

(c) 4 dm^3

(d) 5 dm^3

Answer.

Correct option is (c) 5 dm^3

By combined gas equation,

$$\frac{P_1 \times V_1}{T_1} = \frac{P_2 \times V_2}{T_2}$$

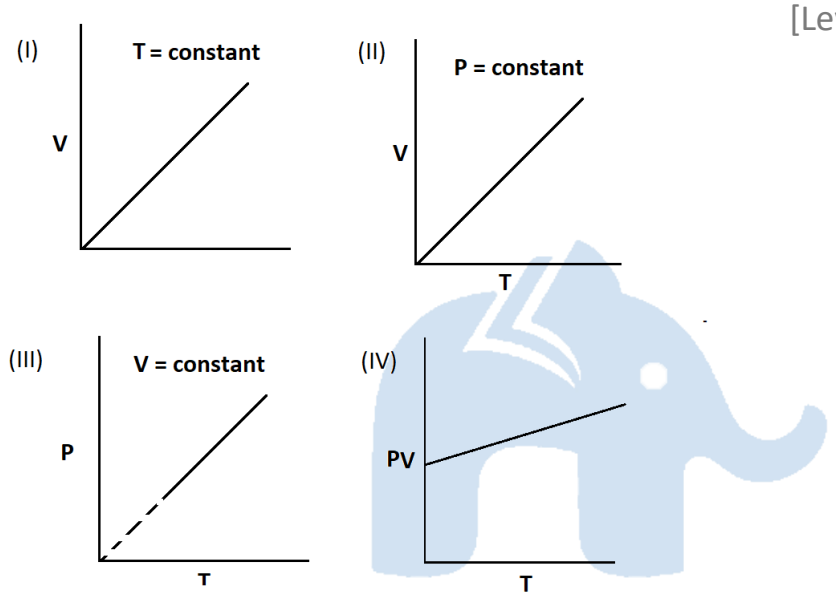
$$\frac{P \times 5}{T} = \frac{3P \times V_2}{3T}$$

$V_2 = 5dm^3$

Question 10.

Which of the following graph are correct?

[Level: Moderate]



Correct option will be –

(a) (I), (II) & (III) are correct

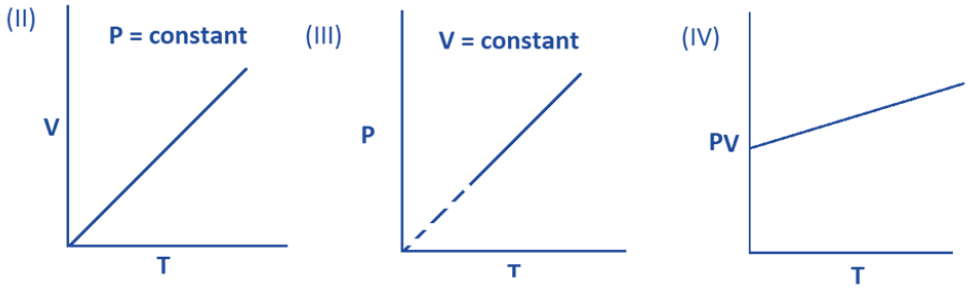
(b) (II), (III) & (IV) are correct

(c) (I) & (II) are correct

(d) (I)& (IV) are correct

Answer.

Correct option is (b) (II), (III) & (IV) are correct



Question 11.

Steam distillation is based on – [Level: Moderate]

(a) Boyle's law

(b) Charles's law

(c) Dalton's law of partial pressure

(d) Avogadro's law

Answer.

Correct option is (c) Dalton's law of partial pressure

Dalton's law of partial pressure states that "the total pressure exerted by a mixture of gases is equal to the sum of the partial pressures of the gases in the mixture"

$P_{total} = P_1 + P_2 + P_3 + P_4 \ldots\ldots\ldots P_n$

In a steam distillation, organic compound and water vaporise together. The mixture boils at a lower temperature when the total vapour pressure becomes equal to atmospheric pressure.

Question 12.

Unit of van der waal's constant "a" is – [Level: Easy]

(a) $L\ mol^{-1}$

(b) $L\ mol^{-1}\ atm$

(c) $L^{-2}\ mol^{2}\ atm$

(d) $L^{2}\ mol^{-2}\ atm$

Answer.

Correct answer is (a) $L^{2}\ mol^{-2}\ atm$

Question 13.

Compressibility factor for 1 mole of a van der waal's gas at Boyle's temperature is – [Level: Difficult]

(a) 1 - $\frac{b^2}{V(V-b)}$

(b) $\frac{b^2}{V(V-b)}$

(c) 1+$\frac{b^2}{V(V+b)}$

(d) 1+$\frac{b^2}{V(V-b)}$

Answer.

Correct option is (d) 1+$\frac{b^2}{V(V-b)}$

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

P = $\frac{RT}{V-b}-\frac{a}{V^2}$

Z = $\frac{PV}{RT}=\frac{V}{V-b}-\frac{a}{VRT}$

As $T_b=\frac{a}{Rb}$ (Boyle's Temperature)

Z = $\frac{V}{V-b}-\frac{b}{V}$

Z = 1 + $\frac{b^2}{V(V-b)}$

Question 14.

Ratio of Most probable velocity, Average velocity and Root mean square velocity is –[Level: Easy]

(a) 1.128:1:1.224 respectively

(b) 1.224:1.128: 1 respectively

(c) 1:1:1.224 respectively

(d) 1:1.128:1.224 respectively

Answer.

Correct option is (d). 1:1.128:1.224 respectively

$\alpha : \bar{u} : u_{rms} = 1 : 1.128 : 1.224$

$u_{rms} > \bar{u} > \alpha$ *(Additional relation)*

Question 15.

The ratio of rate of diffusion of Hydrogen and Methyl chloride under similar conditions of constant temperature and pressure is: [Level: Moderate]

(a) 25

(b) 5

(c) 5.5

(d) 0.5

Answer.

Correct option is (b) 5

Rate of diffusion $\propto \sqrt{\frac{1}{M}}$

Rate of diffusion and molecular weight for Hydrogen are r_1 and M_1

Rate of diffusion and molecular weight for Methyl chloride are r_2 and M_2

Molecular weight for hydrogen and methyl chloride is 2g and 50g

We know that,

$\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$

$\frac{r_1}{r_2} = \sqrt{\frac{50}{2}}$

$\frac{r_1}{r_2} = 5$

Question 16.

Some Quantity of gas A Occupies a volume of 1.2 L when collected over water at 300K and a pressure 0.81 bar. The same Gas A occupied a volume of 0.251 L at STP in dry conditions. Calculate the aqueous tension at 300 K. [Level: Difficult]

(a) 0.45 bar

(b) 0.6 bar

(c) 5.9 bar

(d) 0.159 bar

Answer.

Correct option is (b) 0.6 bar

Let the aqueous tension at 300K be p bar

Thus, pressure of the dry gas at 300K

= (0.81-p)

Now,

P_1 =(0.81-p)

V_1 =1.2L

T_1= 300K

|

P_2 = 1 bar

V_2= 0.251L

T_2= 273k

$$\frac{P_1 \times V_1}{T_1} = \frac{P_2 \times V_2}{T_2}$$

$$\frac{(0.81-p) \times 1.2}{300K} = \frac{1 \times 0.251}{273}$$

$$(0.81 - p) = \frac{1 \times 0.251 \times 300}{273 \times 1.2}$$

$$(0.81 - p) = 0.22$$

$$(0.81 - 0.22) = p$$

$$P = 0.59 \sim 0.6$$

Question 17.

What will be the pressure of 5 mol of an ideal gas at 314K having volume 11.8 L? [Level: Easy]

(a) 1 atm

(b) 2.12 atm

(c) 9.0 atm

(d) 11 atm

Answer.

Correct option is (d) 10.92 atm

We know that,

PV = nRT

$P = \frac{nRT}{V}$

$P = \frac{5 \times 0.0821 \times 314}{11.8}$

$P = 10.92 \approx 11 Atm$

Question 18.

The dimension of pressure are same as that of : [Level: Easy]

(a) Energy

(b) Force per unit area

(c) Energy per unit volume

(d) force per unit volume

Answer.

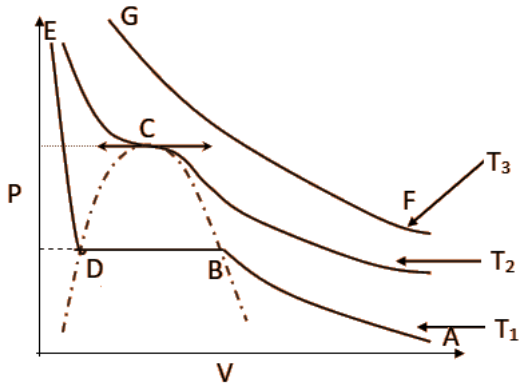
Correct option is (b) Force per unit area

Mathematically expression is –

$P = \frac{F}{A}$

Question 19.

Match the following with the help of following graph [Level: Moderate]



	Column – I		**Column – II**
A	Substance exist in both liquid and gas state	**P**	At AB Part
B	Only liquid state exist	**Q**	At AB Part
C	Substance exist in gas state only	**R**	At AB Part
D	Real gas Is called super critical fluid	**S**	At AB Part
		T	At GF Curve

(a) A→Q,S ;B →T; C→S; D→R,T

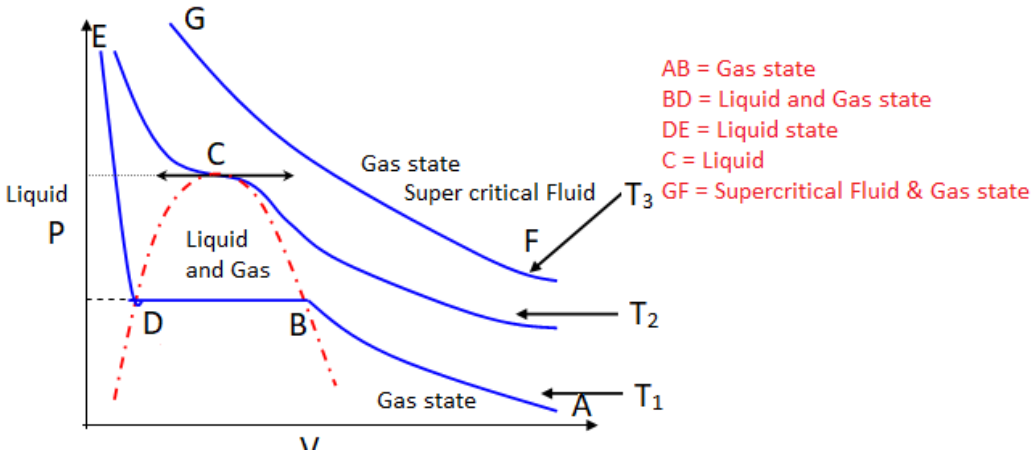
(b) A→Q,S ; B→R; C→P,T, D→T

(c) A→Q, S;→T; C→S; D→T

(d) A→Q,R ;B→T, C→S, D→R,

Answer.

Correct option is (b) A→Q,S ; B→R; C→P,T, D→T



Question 20.

Find the kinetic energy of 12 mol of gas at 150^0C. [Level: Easy]

Answer.

$K.E = \frac{3}{2} RT$

Given,

$R = 8.314 \times 10^7 ErgK^{-1}Mol^{-1}$

$T = 150 + 273.15$

$T = 423K$

$Mole(n) = 12$

$K.E = \frac{3}{2} \times 8.314 \times 10^7 \times 423K$

$K.E = \frac{3}{2} \times 10 \times 8.314 \times 10^7 \times 423K$

$K.E = 52752.3 \times 10^7 erg$

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