NEET UG (2024)
Chemistry
Quiz-13

Section - A

1. Equal molecules of N_2 and O_2 are kept in a closed container at pressure P. If N_2 is removed from the system, then the pressure of the container will be

(1) P (2) P/2
(3) P/4 (4) 2P

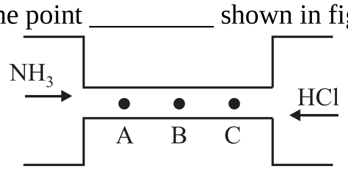
2. A gas occupies 20 litre of volume under STP. What will be its volume if the pressure is increased four times keeping the temperature constant?

(1) 20 L
(2) 80 L
(3) 5 L
(4) 4 L

3. Absolute zero is

(1) –273 °C
(2) Zero K
(3) Temperature at which no substance exists in gaseous state
(4) All of these

4. If both gases NH_3 and HCl are released at the same time then white precipitate will be formed near the point _________ shown in figure



(1) A
(2) B
(3) C
(4) Precipitate will not be formed

5. Which is/are correct statement(s) according to kinetic molecular theory of gases ?

(1) There is no force of attraction or repulsion between gas molecules at ordinary temperature and pressure
(2) Actual volume of gas molecules is negligible in comparison to the total volume of the gas
(3) Their collisions are perfectly elastic
(4) All of these

6. A solution is prepared by adding 4 moles of substance A to 300 g of water. Calculate molality of the solution.

(1) 0.1333 m
(2) 1.333 m
(3) 0.0133 m
(4) 13.33 m

7. Equal volume of two gases ‘A’ & ‘B’ diffuse through a porous pot in 40 and 10 seconds respectively. If the molar mass of ‘A’ is 100 g/mol, then the molar mass of gas ‘B’ is

(1) 10 g/mol
(2) 8.5 g/mol
(3) 6.25 g/mol
(4) 4 g/mol

8. An open flask contains air at 27 °C. To what temperature it must be heated to expel one-fourth of the air ?

(1) 127 °C (2) 65 °C
(3) 927 °C (4) 460 °C

9. Equal masses of H_2, He and CH_4 are mixed in an empty container at 300 K when total pressure is 2.6 atm. The partial pressure of H_2 in the mixture is

(1) 0.5 atm
(2) 1.6 atm
(3) 0.8 atm
(4) 0.2 atm

10. 6.02×10^{20} molecules of urea are present in 100 ml of its solution. The concentration of the solution is:

(1) 0.001 M
(2) 0.02 M
(3) 0.01 M
(4) 0.1 M

11. A solution is prepared by adding 2 g of a substance A to 18 g of water. Calculate the mass percent of the solute.

(1) 20 % (2) 10 %
(3) 30 % (4) 15 %

12. Critical temperatures of H_2O, NH_3 CO_2 and O_2 respectively are 647.1 K, 405.5 K, 304.1 K and 154.3 K. Which one will liquify first when we start cooling from 700 K ?

(1) H_2O (2) NH_3
(3) CO_2 (4) O_2

13. The mole fraction of solute in one molal aqueous solution is:

(1) 0.018 (2) 0.009
(3) 0.027 (4) 0.036

14. A real gas has critical temperature and critical pressure as 40 °C and 10 atm respectively, then liquefaction of gas is possible at

(1) 50 °C and 8 atm
(2) 45 °C and 8 atm
(3) 25 °C and 12 atm
(4) 45 °C and 12 atm

15. Helium atom is two times heavier than hydrogen molecule. At 25ºC, the kinetic energy of helium atom is:

(1) Half than hydrogen
(2) Double than hydrogen
(3) Same as hydrogen
(4) Four times than hydrogen

16. Real gases show same behaviour as that of an ideal gas at:

(1) High temperature and high pressure
(2) Low temperature and high pressure
(3) High temperature and low pressure
(4) Low temperature and low pressure

17. In van der Waal's equation, the constant 'b' is the measure of:

(1) Intermolecular collisions per unit volume
(2) Intermolecular repulsions
(3) Intermolecular attractions
(4) Volume occupied by the molecules

18. Ideal gas equation for one mole of an ideal gas:

(1) PV = nRT (2) PV = RT
(3) $P = \frac{nRT}{V}$ (4) $V = \frac{nRT}{P}$

19. The total kinetic energy of the molecules in 8 g of CH_4 at 27ºC in joules is:

(1) 935.3 J (2) 700 J
(3) 3741.3 J (4) 1870.65 J

20. The temperature of a gas is raised from 27 °C to 927 °C. The root mean square speed of the gas

(1) Remains same
(2) Gets $\sqrt{\frac{927}{27}}$ times
(3) Gets halved
(4) Gets doubled

21. The compressibility of a gas is less than unity at STP. Therefore

(1) $V_m > 22.4$ L (2) $V_m < 22.4$ L
(3) $V_m = 22.4$ L (4) $V_m = 44.8$ L

22. Gas is more difficult to compress when Z is

(1) 0 (2) 1/2
(3) 1 (4) 2

23. The ratio of Boyle's temperature and critical temperature for a gas is

(1) 8/27 (2) 27/8
(3) 1/2 (4) 2/1

24. Which of the following pair will diffuse at the same rate ?

(1) CO_2 and N_2O
(2) CO_2 and NO
(3) CO_2 and CO
(4) N_2O and NO

25. At relatively high pressure, van der Waals equation for one mole of gas reduces to

(1) PV = RT (2) $PV = RT + \frac{a}{V}$
(3) $PV = RT + Pb$ (4) $PV = RT - \frac{a}{V^2}$

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

(1) $Z = 1 + \frac{pb}{RT}$ (2) $Z = 1 + \frac{RT}{pb}$
(3) $Z = 1 - \frac{a}{VRT}$ (4) $Z = 1 - \frac{Pb}{RT}$

27. The total number of protons in 10 *g* of calcium carbonate is ($N_0 = 6.023 \times 10^{23}$)

(1) 1.5057×10^{24}
(2) 2.0478×10^{24}
(3) 3.0115×10^{24}
(4) 4.0956×10^{24}

28. The numbers of moles of $BaCO_3$ which contain 1.5 moles of oxygen atoms is
(1) 0.5 (2) 1
(3) 3 (4) 6.02×10^{23}

29. 1g atom of nitrogen represents:
(1) 6.02×10^{23} N_2 molecules
(2) 22.4 L of N_2 at S.T.P.
(3) 11.2 L of N_2 at S.T.P.
(4) 28 g of nitrogen

30. The number of oxygen atoms present in 14.6 g of magnesium bicarbonate is:
(1) 6 N_A (2) 0.6 N_A
(3) N_A (4) $\frac{N_A}{2}$

31. Two flask A and B of equal size contain 2 g of H_2 and 2 g of N_2 respectively at the same temperature. The number of molecules in flask A is:
(1) Same as those in flask B
(2) Less than those in flask B
(3) Greater than those in flask B
(4) Exactly half than those in flask B

32. The maximum volume at S.T.P. is occupied by:
(1) 12.8 g of SO_2
(2) 6.02×10^{22} molecules of CH_4
(3) 0.5 ml of NO_2
(4) 1 g molecule of CO_2

33. The vapour density of gas A, is four times that of B. If molecular mass of B is M, then molecular mass of A is:
(1) M (2) 4M
(3) M/4 (4) 2M

34. On analysis a certain compound was found to contain iodine and oxygen in the ratio of 254 g of iodine (at mass 127) and 80 g oxygen (at mass 16). What is the formula of compound?
(1) IO (2) I_2O
(3) I_5O_3 (4) I_2O_5

35. 100 ml of PH_3 on decomposition produced phosphorus and hydrogen. The change in volume is:
(1) 50 ml increase
(2) 500 ml decrease
(3) 900 ml decrease
(4) Nil

Section - B

36. An aqueous solution of ethanol has density 1.025 g/ml and molarity 8 M. The molality of this solution is: [Ethanol $\rightarrow C_2H_5OH$]
(1) 20.27 (2) 17.12
(3) 12.17 (4) 1.117

37. $SO_2 + 2H_2S \rightarrow 3S + 2H_2O$
2 mol of H_2S and 11.2 L SO_2 at NTP react to form x mol of sulphur; x is
(1) 1.5 (2) 3
(3) 11.2 (4) 6

38. In the reaction,
$$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(l)$$
when 1 mol of ammonia and 1 mol of O_2 are made to react to completion then
(1) 1.0 mol of H_2O will be produced
(2) 1.0 mol of NO will be produced
(3) all the oxygen will be consumed
(4) all the ammonia will be consumed

39. Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2. When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weights of X and Y are:
(1) 40, 30 (2) 60, 40
(3) 20, 30 (4) 30, 20

40. The vapour density of a gas is 11.2. The volume occupied by one gram of the gas at STP is
(1) 1.0 L (2) 11.2 L
(3) 22.4 L (4) None of these

41. How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atom?
(1) 0.02 (2) 3.125×10^{-2}
(3) 1.25×10^{-2} (4) 2.5×10^{-2}

42. The number of moles of electron present in 64 g of CH_4 are
(1) 64 (2) 40
(3) 24 (4) 16

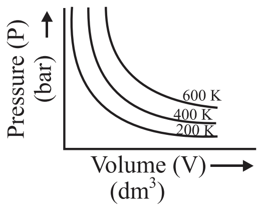
43. Which among the following has highest number of atoms?
(1) 5 g of CO_2
(2) 4 g of CO
(3) 1 g of H_2
(4) 6 g of O_3

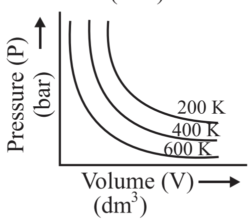
44. The pressure exerted by a mixture of 3.5 g of N_2 and 4 g of H_2 contained in a 8.21 dm^3 flask at 27 °C is

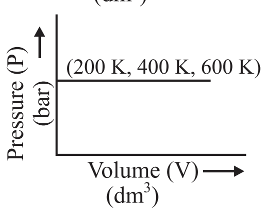
(1) 5.925 atm (2) 6.375 atm

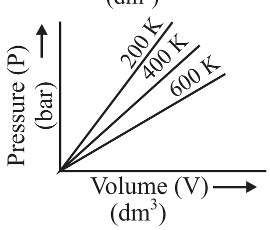
(3) 8.217 atm (4) 3.291 atm

45. Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. volume of a gas at different temperatures

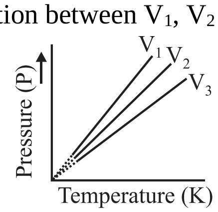
(1) 

(2) 

(3) 

(4) 

46. Consider following graph for fixed mass of a gas correct relation between V_1, V_2 and V_3 is



(1) $V_3 > V_1 > V_2$

(2) $V_1 > V_2 > V_3$

(3) $V_2 > V_1 > V_3$

(4) $V_3 > V_2 > V_1$

47. Which of the following mixture of gases does not obey Dalton's Law of partial pressures?

(1) Cl_2 and SO_2 (2) CO_2 and He

(3) O_2 and CO_2 (4) N_2 and O_2

48. The ratio of most probable velocity, average velocity and root mean square velocity is

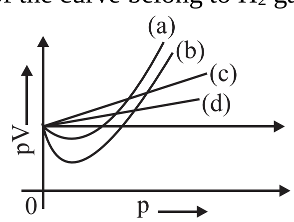
(1) $\sqrt{2}:\sqrt{\frac{8}{\pi}}:\sqrt{3}$

(2) $1:\sqrt{2}:\sqrt{3}$

(3) $\sqrt{2}:\sqrt{3}:\sqrt{8}$

(4) $1:\sqrt{8\pi}:\sqrt{3}$

49. Which of the curve belong to H_2 gas at 273 K?



(1) a

(2) b

(3) c

(4) d

50. Temperature at which the root mean square speed of oxygen gas becomes equal to most probable speed of sulphur dioxide gas at 600 K is

(1) 300 K

(2) 200 K

(3) 400 K

(4) 600 K

1. **(2)**

$$\boxed{\begin{array}{c}N_2\\O_2\end{array}}\quad \begin{array}{r|l}\text{Pressure} = P & n_{O_2} = N_2 = N \text{ molecules.}\\ \text{Constant T \& V.} & \text{Total molecules} = 2N\end{array}$$

If N_2 is removed, then pressure reduces to P/2

PV = nRT

$\boxed{P \propto n \propto N}$

2. **(3)**

$V_1 = 20$ L $\qquad V_2 = ?$

$P_1 \qquad P_2 = 4P_1$

At constant temperature

$P_1V_1 = P_2V_2$

$\Rightarrow \quad V_2 = \dfrac{20 \times P_1}{4P_1} = 5\text{ L}$

3. **(4)**

Absolute zero → '0' K or – 273.15°C.

$$V_t = V_{0°C} + \frac{1}{237.15} \times V_{0°C} \times t°C$$

At $t_2 = -273.15°C$, $V_t = 0$

4. **(3)**

Rate of diffusion $\alpha \dfrac{1}{\sqrt{\text{molar mass}}}$

$M_{NH_3} < M_{HCl}$

NH_3 diffuses faster, it will reach near to HCl side forming white ppt at point 'C'.

5. **(4)**

According to Kinetic theory of gases, gas is assumed to be ideal &

- There is no force of attraction/repulsion b/w gas molecules at ordinary temperature & pressure.
- Actual volume of gas molecules is negligible in comparison to total volume of gas.
- Collisions among gas molecules are elastic.

6. **(4)**

$$\text{Molality of solution} = \frac{n_{solute}}{W_{kg}\ \text{solvent}}$$

$$= \frac{4}{300/1000}$$

$$= \frac{4}{1} \times \frac{1000}{300}$$

$$= \frac{40}{3}$$

$= 13.33$ m

7. **(3)**

$$\frac{r_A}{r_B} = \frac{\frac{V_A}{t_A}}{\frac{V_B}{t_B}} = \sqrt{\frac{M_B}{M_A}}$$

If $V_A = V_B$, then

$$\frac{r_A}{r_B} = \frac{t_B}{t_A} = \sqrt{\frac{M_B}{M_A}}$$

$$\Rightarrow \frac{10}{40} = \sqrt{\frac{M_B}{100}}$$

$$\left(\frac{1}{4}\right)^2 = \frac{M_B}{100}$$

$$\Rightarrow \quad M_B = \frac{100}{16} = 6.25\text{ g / mol.}$$

8. **(1)**

$n_1T_1 = n_2 T_2$

$T_1 = 27°C = 300$ K

If $\dfrac{1}{4}$ of air is expelled, then remaining amount of air in flask → $n_2 = n_1 - \dfrac{n_1}{4}$.

$n_2 = \dfrac{3}{4}n_1$

$n_1 T_1 = n_2 T_2$

$n_1 \times 300 = \dfrac{3}{4}n_1 \times T_2$

$\boxed{T_2 = 400K}$

$\Rightarrow T_2 = 126.85$ °C = 127 °C.

9. **(2)**

$w_{H_2} = w_{He} = w_{CH_4} = w$

Partial pressure of H_2 = $x_{H_2} \times P_{total}$

$$= \frac{n_{H_2}}{n_{H_2} + n_{He} + n_{CH_4}} \times 2.6$$

$$= \frac{\frac{w}{2}}{\frac{w}{2} + \frac{w}{4} + \frac{w}{16}} \times 2.6$$

$$= \frac{1/2}{1/2 + 1/4 + 1/16} \times 2.6$$

$$= \frac{1}{2} \times \frac{16}{13} \times 2.6 = 1.6 \text{ atm}$$

10. **(3)**

$$\text{Moles} = \frac{\text{Molecules}}{N_A}$$

$$= \frac{6.02 \times 10^{20}}{6.02 \times 10^{23}}$$

$$= 1 \times 10^{-3}$$

Thus,

$$\text{Molarity} = \frac{n_{solute}}{V_L \text{ solution}}$$

$$= \frac{1 \times 10^{-3}}{100/1000}$$

$$= \frac{1 \times 10^{-3}}{10^2/10^3}$$

$$= \frac{1 \times 10^{-3}}{10^{-1}}$$

$$= 1 \times 10^{-2}$$

$$= 0.01 \text{ M}$$

11. **(2)**

$$\text{Mass \% of solute} = \frac{w_{solute}}{w_{solution}} \times 100$$

$$= \frac{2 \text{ g}}{2\text{g} + 18 \text{ g}} \times 100$$

$$= \frac{2 \text{ g}}{20 \text{ g}} \times 100$$

$$= 10 \%$$

12. **(1)**
Ease of liquefaction $\propto$ critical temperature.
On cooling from 700 K, H_2O will liquefy first.

13. **(1)**
1 molal aqueous solution means 1 mole of solute is dissolved in 1000 g of water.
Thus,

$$\chi_{solute} = \frac{n_{solute}}{n_{solute} + n_{solvent}}$$

$$= \frac{1}{1 + \frac{1000}{18}}$$

$$= \frac{1}{1 + 55.55}$$

$$= \frac{1}{56.55}$$

$$= 0.0177$$

$$= 0.018$$

14. **(3)**
$T_C = 40°C$, $P_C = 10$ atm
Gas is liquefied when $T \le T_C$
$T \ge P_C$
At 25°C, & 12 atm, liquefaction is possible.

15. **(3)**

$$KE = \frac{3}{2} nRT \text{ or } KE \propto T$$

16. **(3)**
Real gases show same behaviour as that of an ideal gas at **high temperature** and **low pressure.**

17. **(4)**
In van der Waal's equation, the constant 'b' is the measure of volume occupied by the molecules.

18. **(2)**
Ideal gas equation for n moles is PV = nRT
when n = 1 then,
Ideal gas equation is PV = RT

19. **(4)**

$$KE = \frac{3}{2} nRT$$

$$= \frac{3}{2} \times \frac{8}{16} \text{mol} \times 8.314 \text{ J K}^{-1}\text{mol}^{-1} \times 300 \text{ K}$$

$$= 1870.65 \text{ J}$$

20. **(4)**

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

$T_1 = 27°C = 300$ K
$T_2 = 927°C = 1200$ K

$$\frac{C_2}{C_1} = \sqrt{\frac{T_2}{T_1}} = \sqrt{\frac{1200}{300}} = 2$$

$$C_2 = 2C_1$$

21. **(2)**

$Z < 1$

$$\frac{V_{real}}{V_{ideal}} < 1$$

$V_{real} < V_{ideal}$

$V_{real} < 22.4$ L

22. **(4)**

If $Z > 1$, then compression of gas is difficult.

23. **(2)**

$T_b = \dfrac{a}{Rb}$ $\qquad$ $T_c = \dfrac{8a}{27Rb}$

$$\frac{T_b}{T_C} = \frac{27}{8}$$

24. **(1)**

Rate of diffusion $\alpha \dfrac{1}{\sqrt{M}}$

CO_2	N_2O
44 g/mol	44 g/mol

same rate of diffusion

25. **(3)**

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

At very high pressures repulsive forces b/w the molecules dominate ($a \to 0$).

(P) $(V - nb) = nRT$

$n = 1$

$PV - Pb = RT$

$PV = Pb + RT$

$$\frac{PV}{RT} = \frac{Pb}{RT} + 1$$

$$\Rightarrow Z = 1 + \frac{Pb}{RT}$$

26. **(3)**

At low pressure, $V - b \approx V$

Now, $\left(P + \dfrac{a}{V^2}\right)V = RT$

$$PV + \frac{a}{V} = RT$$

$$\frac{PV}{RT} = 1 - \frac{a}{VRT}$$

27. **(3)**

$\because$ 100gm $CaCO_3 = 6.023 \times 10^{23}$ molecules

$\therefore$ 10gm $CaCO_3 = \dfrac{6.023 \times 10^{23}}{100} \times 10$

$= 6.023 \times 10^{22}$ molecule

1 molecule of $CaCO_3$ = 50 protons

6.023×10^{22} molecule of $CaCO_3$

$= 50 \times 6.023 \times 10^{22}$

$= 3.0115 \times 10^{24}$

28. **(1)**

$\because$ 3 moles of oxygen is that in 1 mole of $BaCO_3$

$\therefore$ 1.5 moles of oxygen is that in mole of $BaCO_3$

$$= \frac{1}{3} \times 1.5 = \frac{1}{2} = 0.5$$

29. **(3)**

1 g atom of Nitrogen

= 1 mole of Nitrogen atoms

= 6.022×10^{23} N atoms

1 mol of N $= \dfrac{1}{2}$ mole of N_2

= 11.2 L of N_2 at STP

30. **(2)**

$Mg(HCO_3)_2$	Magnesium
14.6 g	Bicarbonate

Molar mass = 146 g/mol

Number of Moles $= \dfrac{14.6}{146} = 0.1$

No. of Molecules = $0.1 \times N_A$

$0.6 \times N_A$ 'O' atoms

31. **(3)**

Flask	A	B
	'V'L	'V'L
	2g H_2	2g N_2
	$\dfrac{2}{2} = 1$ mol H_2	$\dfrac{2}{28} = \dfrac{1}{14}$ mol N_2
	N_A Molecules $\gg$	$\dfrac{1}{14} \times N_A$ Molecules
	of H_2	of N_2

32. **(4)**

(a) 12.8g SO_2 $= \dfrac{12.8}{64} = 0.2$ mol

$= 0.2 \times 22.4$ L

(b) 6.02×10^{22} molecules of CH_4

= 0.1 mole $= 22.4 \text{ L} \times 0.1$

= 2.24 L

(c) 0.5 mL NO_2

(d) 1 g molecule $CO_2 \Rightarrow$ 1 mole = 22.4 L

33. (2)

$(\text{Vapour density})_A = 4 \times (\text{Vapour density})_B$

$$\frac{M_A}{2} = 4 \times \frac{M_B}{2}$$

$M_A = 4M_B$

34. (4)

Moles of Iodine $= \frac{254}{127} = 2$

Moles of Oxygen $= \frac{80}{16} = 5$

Formula of compound is I_2O_5

35. (1)

$$\underset{(g)}{4PH_3} \longrightarrow \underset{(s)}{P_4} + \underset{(g)}{6H_2}$$

4mL $PH_3 \rightarrow$ 6 ml H_2

100 mL $PH_3 \rightarrow \frac{6}{4} \times 100$

$\Rightarrow$150 mL H_2

$\therefore$ Increase in volume = 50 mL

36. (3)

$$m = \frac{1000M}{1000d - MM'}$$

$$m = \frac{1000 \times 8}{1000 \times 1.025 - 8 \times 46}$$

$$m = \frac{8000}{1025 - 368}$$

= 12.17

M = Molarity

M' = Molar mass of solute

d = density

37. (1)

$$\underset{1\text{ mol }SO_2}{SO_2} + \underset{2\text{ mol }H_2S}{2H_2S} \rightarrow \underset{3\text{ mol S}}{3S} + 2H_2O$$

22.4L SO_2 2 mol H_2S 3 mol S

11.2L SO_2 1 mol H_2S $\frac{3}{2}$ mol S

$$x = \frac{3}{2} = 1.5$$

38. (3)

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

4 moles of NH_3 require 5 moles of O_2

1 mole of NH_3 will require = $\frac{5}{4}$ mol of O_2

But given $O_2 \Rightarrow$ 1 mol

$\Rightarrow$ O_2 is limiting Reagent

5 mole $O_2 \rightarrow$ 6 mole H_2O

1 mole $O_2 \rightarrow \frac{6}{5}$ mole H_2O

1 mole $O_2 \rightarrow \frac{4}{5}$ mole NO

39. (1)

Let atomic weight of

$X \rightarrow a$

$Y \rightarrow b$

XY_2 0.1 mol, 10 g

Molecular mass of $XY_2 = \frac{\text{Given mass}}{\text{No. of moles}}$

$$a + 2b = \frac{10}{0.1} = 100 \qquad \ldots(1)$$

X_3Y_2 0.05 mole, 9g

$3a + 2b = \frac{9}{0.05}$

$3a + 2b = 180 \qquad \ldots(2)$

On solving (1) and (2)

a = 40 b = 30

40. (1)

Vapour density of gas = 11.2

Molar mass of gas = 11.2 × 2 = 22.4 g

Given 1 g of gas

Moles $= \frac{1}{22.4}$ mol

1 × 22.4

1.0 L volume at STP

41. (2)

$Mg_3(PO_4)_2$

1 mole of $Mg_3(PO_4)_2 \rightarrow$ 8 mol of 'O' atoms

$\Rightarrow$ For 8 mole of ‘O’ atoms

$\rightarrow$ 1 mole of $Mg_3(PO_4)_3$

For 0.25 mole of ‘O’ atoms

$\frac{1}{8} \times 0.25 = 3.125 \times 10^{-2}$ moles of $Mg_3(PO_4)_2$

42. (2)

64 g CH_4 means $\frac{64}{16}$ = 4 moles

Total No. of electrons in 1 molecule CH_4

= 6 + 4 = 10

4 molar of $CH_4 \rightarrow 4N_A$ molecules

$4N_A$ molecules of $CH_4 \rightarrow 4N_A \times 10$ electrons

= 40 moles of electrons

43. (3)

5g $CO_2 \Rightarrow \frac{5}{44} \times N_A \times 3$ atoms = 0.34 N_A

4g CO $\Rightarrow \frac{4}{28} \times N_A \times 2$ atoms = 0.28 N_A

1g $H_2 \Rightarrow \frac{1}{2} \times N_A \times 2$ atoms = N_A

6g $O_3 \Rightarrow \frac{6}{48} \times N_A \times 3$ atoms = 0.375 N_A

44. (2)

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

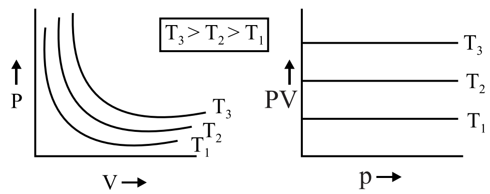
$$n = n_{N_2} + n_{H_2}$$

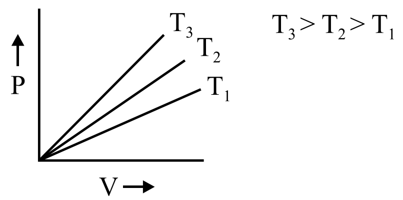
$$= \frac{3.5}{28} + \frac{4}{2} = 0.125 + 2 = 2.125 \text{ mol}$$

$$P = \frac{2.125 \times 0.0821 \times 300}{8.21}$$

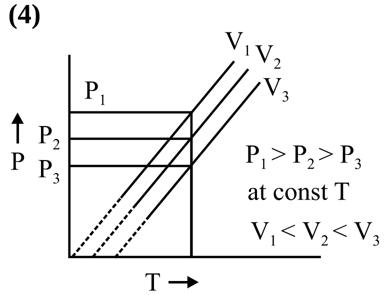
P = 6.375 atm.

45. (1)





46. (4)



47. (1)

Non reactive gaseous mixture follow Dalton's law.

Mixture of Cl_2 & $SO_2 \rightarrow$ Reactive

$$Cl_2 + SO_2 \rightarrow SO_2Cl_2$$

48. (1)

$$C_{mps} = \sqrt{\frac{2RT}{M}}$$

$$C_{average} = \sqrt{\frac{8RT}{\pi M}}$$

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

$$\sqrt{\frac{2RT}{M}} : \sqrt{\frac{8RT}{\pi M}} : \sqrt{\frac{3RT}{M}}$$

$$\sqrt{2} : \sqrt{\frac{8}{\pi}} : \sqrt{3}.$$

49. (3)

For H_2, pV increases always with increase in P.

H_2 shows positive deviation from ideality always.

50. (2)

$$(C_{rms})_{O_2} = (C_{mps})_{SO_2}$$

$$\sqrt{\frac{3RT_{O_2}}{M_{O_2}}} = \sqrt{\frac{2RT_{SO_2}}{M_{SO_2}}}$$

$$3 \times \frac{T_{O_2}}{M_{O_2}} = \frac{2 \times T_{SO_2}}{M_{SO_2}}$$

$$T_{O_2} = \frac{2}{3} \times 600 \times \frac{32}{64}$$

$$T_{O_2} = 200 \text{ K}$$