PHYSICAL CHEMISTRY

DPP
DAILY PRACTICE PROBLEMS

DPP No. 33

Total Marks : 26

Max. Time : 28 min.

Topic : Gaseous State

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.6	(3 marks, 3 min.)	[18, 18]
Subjective Questions ('–1' negative marking) Q.7 to Q.8	(4 marks, 5 min.)	[8, 10]

1. The vapour pressure of water depends upon :
   (A) Surface area of water in container   (B) Volume of container
   (C) Temperature   (D) All of these

2. Among the following substances, the maximum vapour pressure is exerted by :
   (A) Water (b.pt. = 100ºC)   (B) Acetone (b.pt. = 56ºC)
   (C) Ethanol (b.pt. = 78ºC)   (D) Chloroform (b.pt. = 61ºC)

3. A sample of air is saturated with benzene (vapour pressure = 100 mm Hg at 298 K) at 298K, 750 mm Hg pressure. If it is isothermally compressed to one third of its initial volume, the final pressure of the system is:
   (A) 2250 torr   (B) 2150 torr   (C) 2050 torr   (D) 1950 torr

4. A vessel has nitrogen gas and water vapours in equilibrium with liquid water at a total pressure of 1 atm. The partial pressure of water vapours is 0.3 atm. The volume of this vessel is reduced to one third of the original volume, at the same temperature, then total pressure of the system is :(Neglect volume occupied by liquid water)
   (A) 3.0 atm   (B) 1 atm   (C) 3.33 atm   (D) 2.4 atm

5. 60 mL of pure dry O_2 is subjected to silent electric discharge. If only 20% of it is converted to O_3, volume of the mixture of gases (O_2 and O_3) after the reaction is V_1 mL and after passing through turpentine oil is V_2 mL. V_1 and V_2 are :
   (A) 56 mL and 52 mLrespectively   (B) 48 mL and 40 mL respectively
   (C) 48 mL and 44 mL respectively   (D) 56 mL and 48 mL respectively

6. 15 mL of a gaseous hydrocarbon was exploded with 72 mL of oxygen. The volume of gases on cooling was found to be 57 mL, 30 mL of which was absorbed by KOH and the rest was absorbed in a solution of alkalline pyrogallol. Then the formula of hydrocarbon is :
   (A) C_3H_4 (B) C_2H_4 (C) C_2H_6 (D) C_3H_6

7. 1 litre of a mixture of CO and CO_2 is taken. This mixture is passed through a tube containing red hot charcoal, where the following reaction takes place :
   $$CO_2 + C \longrightarrow 2CO$$
   The volume now becomes 1.6 litres. Find the volume of gas sample obtained by passing 1 litre of initial gas mixture through KOH solution.

8. 1120 mL of ozonised oxygen (O_2 + O_3) at STP weighs 1.76 g. Calculate the reduction in volume on passing this through alkalline pyrogallol solution

Answer Key

1.	(C)	2.	(B)	3.	(C)	4.	(D)	5.	(D)
6.	(B)	7.	CO= 0.4L	8.	896 mL.				

Hints & Solutions

DPP No. # 33

1. (a) V.P. depends on temperature.

3. Pressure of air = 750 – 100 = 650 mm of Hg
on compressing P_f = Hg 650 × 3 mm of Hg
$\qquad$ = 1950 mm of Hg
so $\qquad P_T$ = (1950 + 100) = 2050 mm of Hg

4. $P_{N_2} + P_{H_2O(v)}$ = 1 atm, $\because P_{H_2O}$ = 0.3 atm

$\qquad \therefore P_{N_2}$ = 0.7 atm

Now new pressure of N_2 in another vessel of volume V/3 at same T is given by :

$$P_{N_2} \times \frac{V_1}{3} = 0.70 \times V_1$$

$\qquad \therefore P_{N_2}$ = 2.1 atm

Since aqueous tension remains constant, and thus total pressure in new vessel.

$\qquad = P_{N_2} + P_{H_2O}$ = 2.1 + 0.3 = 2.4 atm.

5. $\qquad 3O_2 \rightleftharpoons 2O_3$
t = 0 $\quad$ 60
t = t_1 $\quad$ 48 $\qquad\qquad$ 8
so V_1 = 48 + 8 = 56 $\qquad$ and V_2 = 48 (on passing through turpentine oil, O_3 will be absorbed.)

7. $\qquad CO_2 + C \longrightarrow 2CO$
At t = 0 $\quad$ x L $\qquad\qquad$ (1 – x) L
At = t $\qquad$ 0 $\qquad\qquad$ 2x L
1 – x + 2x = 1.6
1 + x = 1.6
x = 0.6 L
1 – x = 0.4 L

8. 896 mL.