PHYSICAL CHEMISTRY

DPP

DAILY PRACTICE PROBLEMS

DPP No. 27

Total Marks : 36

Max. Time : 36 min.

Topic : Gaseous State

Type of Questions — **M.M., Min.**

Single choice Objective ('–1' negative marking) Q.1 to Q.12 (3 marks, 3 min.) [36, 36]

1. At what pressure would a gas sample consisting of 2 mole CO_2 gas occupy a volume of 5.6 L at 273ºC :
(A) 32 atm (B) 24 atm (C) 16 atm (D) 8 atm

2. A sample of N_2O gas occupies a volume of $0.1 m^3$ at 684 mm of Hg pressure and 87ºC. The number of molecules present in the gas sample is : (Take R = $\frac{1}{12}$ L atm K^{-1} mol^{-1})
(A) 1.8066×10^{23} (B) 1.2044×10^{24} (C) 6.022×10^{23} (D) 1.8066×10^{24}

3. If the volume occupied by x mole of ethane (C_2H_6) gas at 2.46 atm pressure and 27ºC temperature is 0.5 L then the value of x is :
(A) 0.5 (B) 0.05 (C) 0.005 (D) 0.0005

4. A gas mixture consisting of 0.1 mole each of O_2 and N_2 gases occupies a volume of 1×10^4 mL at 38 cm of Hg pressure and a certain temperature. Find the value of T :
(A) 300°C (B) 600 K (C) 300 K (D) 600°C

5. 32 g of SO_2 is stored in a cylinder at 1 atm pressure and at 27ºC temperature. The volume of cylinder is : (Take R = 1/12 L atm K^{-1} mol^{-1})
(A) 12.5 m^3 (B) 12.5 dm^3 (C) 12.5 cc (D) 12.5 mL

6. A cylinder can hold maximum 12.5 L of any liquid when it is fully filled. If ozone gas (O_3) is stored in cylinder at 10^5 Pa pressure and – 73ºC temperature, then the weight of ozone gas in the cylinder is:
(A) 36 kg (B) 12 g (C) 36 g (D) 12 kg

7. A mixture consisting of 54 g N_2O_5 gas, 1.2044×10^{23} molecules of NO gas, 0.2 gram-molecule of N_2O gas and 0.1 mole of N_2 gas would occupy a volume of ..... dm^3 at 760 torr pressure and 27 ºC temprature :
(A) 22.4 (B) 24.6 (C) 0.0246 (D) 0.0224

8. If 66 g of an unknown gas X occupies a volume of about 125 dm^3 at 0.6 bar pressure and 600 K temprature, then the gas X could be :
(A) N_2 (B) N_2O (C) CO (D) CO_2

9. Three different containers contain three different gases with the following parameters :
Container I of volume (V_1), containing 6 g of H_2 gas at 273 K, 1 atm.
Container II of volume (V_2), containing 2 mole of CO_2 gas at 273 ºC, 2 atm.
Container III volume (V_3), containing 24×10^{23} molecules of O_2 gas at 0 ºC, 760 torr .
The correct order of volume of containers is :
(A) I > II > III (B) III > I > II (C) I > III > II (D) II > III > I

10. 3.06 L of H_2O vapour is taken at a pressure of 1 atm and 373 K. It is now condensed to H_2O (ℓ) at 373 K. Calculate the approximate volume occupied by H_2O (ℓ) : (assume density of liquid water at 373 K = 1 g/mL)
(A) 3.06 L (B) 1.8 mL (C) 1.8 L (D) 3.06 mL

11. Which of the following relations is correct : (Where T represents temperature and d represents density) :
(A) 1 bar = 1 torr (B) T (in °C) = T (in K) + 273 (C) 1 $m^3 = 10^{-6}$ mL (D) $d_{g/mL} = \frac{d_{kg/m^3}}{1000}$

12. Two flasks A and B of equal volume contain H_2 gas under same pressure conditions. The temperature in flask A is greater than in flask B. Then :
(A) Flask A contains greater number of moles of H_2 gas than flask B.
(B) Flask B contains greater number of moles of H_2 gas than flask A.
(C) Flask A contains same number of moles of H_2 gas as flask B.
(D) Such a case is not possible.

Answer Key

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1.	(C)	**2.**	(D)	**3.**	(B)	**4.**	(C)	**5.**	(B)
6.	(C)	**7.**	(B)	**8.**	(B,D)	**9.**	(B)	**10.**	(B)
11.	(D)	**12.**	(B)						

Hints & Solutions

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9. Volume of I^{st} gas = 3 × 22.4 = 67.2 L
Volume of II^{nd} gas = 2 × 22.4 = 44.8 L
Volume of III^{rd} gas = 4 × 22.4 = 89.6 L
So, order of volume will be III > I > II

10. PV = nRT
3.06 × 1 = n × 0.0821 × 373
n = 0.1, mass of $H_2O_{(vap)}$ = 1.8 g
$\Rightarrow$ Volume of $H_2O_{(l)}$ =1.8 mL

11. (A) 1 bar ≈ 1 atm = 760 torr
(B) T (in K) = T (in °C) + 273
(C) 1 $m^3 = 10^6$ mL

12. PV = nRT
For equal pressure and volume,

$$n_{H_2} \propto \frac{1}{T}$$

If the temperature in flask A is greater than in flask B, then flask B contains greater number of moles of H_2 gas than flask A.