TOPIC : GASEOUS STATE

1. The van der Waal's equation for n moles of a real gas will be

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

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

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

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

2. The average distance traveled by the molecule between successive collision is called

(a) collision path (b) mean free path

(c) collision diameter (d) collision distance

3. In kinetic gas equation : $PV = \frac{1}{3}$ m NX^2. X refers to

(a) average speed of gas molecules

(b) most probable speed of gas molecules

(c) root mean square speed of gas molecules

(d) Collision frequency

4. Which of the following conditions are not suitable for liquefaction of gases ?

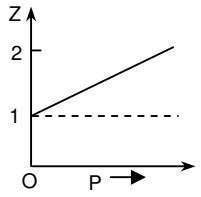
(a) Lowering the temperature

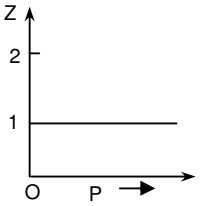
(b) compressing the gas at any temperature

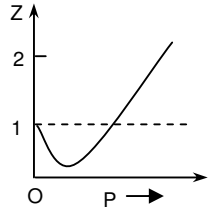
(c) compressing the gas as well as cooling

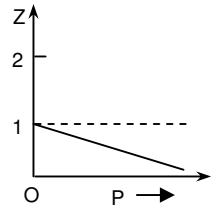
(d) compressing the gas below critical temperature

5. Which of the following represents a plot of compressibility factor (Z) vs P at room temperature for helium ?

(a) 

(b) 

(c) 

(d) 

6. Four gas balloons A, B, C, D of equal volumes containing, H_2, N_2O, CO, CO_2 respectively were pricked with needle and immersed in a tank containing CO_2. Which of them will shrink after some time

(a) All (b) both A, C

(c) only C (d) both A and D

7. Which of the following relations is true for ideal gas ($\overline{E}$ refers to kinetic energy of molecules)

(a) $P = \frac{3V\overline{E}}{2N}$ (b) $P = \frac{2N\overline{E}}{3V}$

(c) $P = \frac{3N\overline{E}}{2V}$ (d) both (b) and (c)

8. Which of the following expressions does not correspond to Boyle's law ?

(a) PV = constant (b) $V_1P_1 = P_2V_2$

(c) both (a) and (b) (d) $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

9. Under which of the following conditions, the real gases will approach the ideal behaviour ?

(a) 15 atm, 200 K (b) 0.5 atm, 500 K

(c) 1 atm, 273 K (d) 15 atm, 500 K

10. The critical temperature of water is higher than that of O_2 because H_2O molecule has

(a) fewer electrons than O_2

(b) two covalent bonds

(c) V-shape

(d) dipole moment > 0.

11. The number of moles of H_2 in 0.224 L of hydrogen at STP (assuming ideal gas behaviour) is

(a) 1 (b) 0.1

(c) 0.01 (d) 0.001

12. The compressibility factor for ideal gas is

(a) 1.5 (b) 1.0

(c) 2.0 (d) ∞

13. Which of the following gas has highest values of 'a'

(a) Ne (b) O_2

(c) Cl_2 (d) N_2

14. The volume occupied by 10.0 g of oxygen at 0°C and 2 atm pressure will be approximately

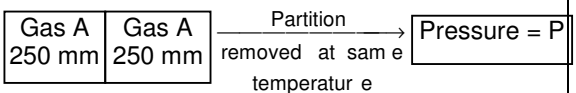
(a) 20 L (b) 4.48 L

(c) 3.5 L (d) 1.5 L

15. Among the gases given below, the highest value of mean free path is for,

(a) N_2 (b) O_2

(c) H_2 (d) Cl_2

16. 

In the above experiment, the value of P is

(a) 250 mm (b) 500 mm

(c) 300 mm (d) 400 mm

17. The average speed of an ideal gas molecule at 27°C is 0.3 m sec^{-1}. The average speed at 927°C will be

(a) 0.6 m sec^{-1} (b) 0.3 m sec^{-1}

(c) 0.9 m sec^{-1} (d) 3.0 m sec^{-1}

18. The rate of diffusion of methane at certain temperature is 2 times that of gas X. The molecular mass of X is

(a) 64.0 (b) 32.0

(c) 4.0 (d) 8.0

19. A certain cylinder contains equal number of molecules of dihydrogen and dioxygen at a total pressure of 740 torr. If dioxygen molecules are completely removed, the pressure will

(a) remain unchanged (b) drop of 740/2 torr

(c) drop of 740/9 torr (d) drop to 740/8 torr

20. Which of the following pairs of gas will diffuse at the same rate under similar conditions ?

(a) carbon dioxide and nitrous oxide

(b) carbon dioxide and nitrogen dioxide

(c) carbon dioxide and nitric oxide

(d) carbon monoxide and carbon dioxide

21. The compressibility factor of real gas is usually greater than one (Z > 1) at high pressure. This is because

(a) the constant a is negligible while b is not

(b) the constant b is negligible while a is not

(c) both a and b are negligible

(d) both a and b are not negligible.

22. A foot-ball bladder contains H_2 and deuterium (D_2) in equimolecular proportion. The ratio of the relative rates of effusion (r_{H_2} ; r_{D_2}) from the punctured foot-ball will be

(a) 1 : 2 (b) 2 : 3

(c) $\sqrt{2}$: 1 (d) 1 : $\sqrt{2}$

23. The vapour density a diatomic gas with homoatomic molecules is 25. The atomic mass of a gas will be

(a) 150 (b) 25

(c) 12.5 (d) 75

24. Under similar conditions which of the following gas will diffuse four times as quickly as oxygen ?

(a) He (b) H_2

(c) N_2 (d) D_2

25. Which among the following samples of gases contains Avogadro number of atoms at S.T.P.?

(a) 2 g of Helium

(b) 11.2 L of carbon monoxide

(c) 11.2 L of sulphur dioxide

(d) 1 mol of phosphine.

26. Equal masses of methane and hydrogen are mixed in an empty container at 25°C. The fraction of total pressure exerted by hydrogen is

(a) $\frac{1}{2}$ (b) $\frac{8}{9}$

(c) $\frac{1}{16}$ (d) $\frac{4}{9}$

27. Which of the following statement is false ?

(a) The product PV for fixed amount of gas is independent of temperature

(b) Molecules of different gases have same KE at a given temperature

(c) The gas equation is not valid at high pressure and low temperature

(d) The gas constant per molecule is known as Boltzmann constant.

28. The mass of CO that can be mixed with 70 g of dry nitrogen so that both have same partial pressure is

(a) 70 g (b) $\frac{70}{28}$ g

(c) 110 g (d) 28×70 g

29. Which of the following gas has rate of diffusion 0.88 times that of phosphine ?

(a) NO_2 (b) N_2O

(c) CH_4 (d) C_2H_2

30. 5.6 L of an unknown gas requires 12.5 calories to raise its temperature by 10^oC at constant volume. The c_p and atomicity of gas are respectively.

(a) 2 cal, 2 (b) 7 cal, 2

(c) 10 cal, 1 (d) 15 cal, 3

31. When a molecule of a gas collides with the wall of a container it gets rebound and the net momentum transferred to wall is equal to

(a) 2mv (b) mv

(c) mv^2 (d) $\frac{1}{2}$ mv^2

32. Three molecules of a gas have speeds, of 2 ms^{-1}, 4 ms^{-1} , 6 ms^{-1} respectively. The root mean square speed at that temperature is

(a) $\frac{(2+4+6)}{3}$ (b) $\sqrt{3}$

(c) $\left(\frac{56}{3}\right)^{1/2}$ (d) $\frac{\sqrt{56}}{3}$

33. 10 g of a gas at 1 atm pressure is cooled from 273^oC to 273 K keeping its volume constant. The pressure of the gas will

(a) remain unchanged (b) become 27 atm

(c) $\frac{1}{2783}$ atm (d) 0.5 atm

34. 500 ml of gas A at 1000 torr and 1000 ml of gas at 800 torr are placed in an empty container of 2 L capacity. The pressure in the container would be

(a) 100 torr (b) 2400 torr

(c) 650 torr (d) 1800 torr

35. In the outer space the pressure recorded is 5×10^{-14} torr. How much outer space could be compressed into 1 dm^3 box at a pressure of 1 atm ?

(a) 1.52×10^{16} dm^3 (b) 4.56×10^{16} dm^3

(c) 2.28×10^{16} dm^3 (d) 1.14×10^{16} dm^3

36. The density of steam at 100^oC and a pressure of 10^5 Pa is 0.5 kg m^{-3}. The compressibility factor (z) is

(a) 0.116 (b) 1.32

(c) 0.96 (d) 1.16

37. How much N_2 is present in 5.0 L of air at STP ? Air contains 79% of dinitrogen by volume

(a) 5.0 g (b) 2.5 g

(c) 4.95 g (d) 7.40 g

38. A bottle is heated with a mouth open from 27^oC to 127^oC, the fraction of air originally present in the bottle that is expelled is

(a) 50% (b) 25%

(c) 33% (d) 40%

39. By how many folds should the temperature of the gas be increased in order to increase the r.m.s. speed of gas molecule in a closed container from 5×10^4 cm s^{-1} to 10×10^4 cm s^{-1}

(a) 0.5 times (b) 0.4 times

(c) 4 times (d) 40 times

40. At certain temperature, 2 volumes of A combine with 5 volumes of B to form 2 volumes of C. If atomicity of A and B is 2. The formula of C is

(a) AB_3 (b) A_2B_5

(c) AB_5 (d) A_5B_2

ANSWER KEY

1	D	**11**	C	**21**	A	**31**	A
2	B	**12**	B	**22**	C	**32**	C
3	C	**13**	C	**23**	B	**33**	D
4	B	**14**	C	**24**	B	**34**	C
5	A	**15**	C	**25**	B	**35**	A
6	B	**16**	A	**26**	B	**36**	D
7	B	**17**	A	**27**	A	**37**	C
8	D	**18**	A	**28**	A	**38**	B
9	B	**19**	B	**29**	B	**39**	C
10	D	**20**	A	**30**	D	**40**	B