UMEED BATCH

GASEOUS STATE

1. What will be the minimum pressure required to compress 500 cm^3 of air at 1 atm to 200 cm^3 at 30ºC?
(A) 1atm (B) 2 atm
(C) 2.5 atm (D) 0.4 atm

2. A certain sample of gas has a volume of 0.2 litre measured at 1 atm pressure and 0ºC. At the same pressure but at 273ºC, its volume will be
(A) 0.4 litre (B) 0.8 litre
(C) 27.8 litre (D) 55.6 litre

3. A gas is found to have a formula $(CO)_x$. If its vapour density is 70, then value of x is
(A) 2 (B) 3
(C) 5 (D) 6

4. 4.4 g of CO_2 contains how many litres of CO_2 at S.T.P.?
(A) 2.4 L (B) 2.24 L
(C) 44 L (D) 22.4 L

5. A certain mass of a gas occupies a volume of 2 litres at STP. Keeping the pressure constant, at what temperature would the gas occupy a volume of 4 litre?
(A) 546ºC (B) 273ºC
(C) 100ºC (D) 50ºC

6. The temperature of 20 litre of Nitrogen was increased from 100 K to 300 K at a constant pressure. The change in volume will be
(A) 80 litre (B) 60 litre
(C) 40 litre (D) 20 litre

7. If the volume of given mass of a gas at constant temperature becomes three times, then pressure will be (assume initial pressure is P atm)
(A) 3P (B) P/3
(C) 9 P (D) P

8. A closed vessel contains equal number of nitrogen and oxygen molecules at a pressure of P mm of Hg. If nitrogen is removed from the system then the pressure will be
(A) P (B) 2P
(C) P/2 (D) $\frac{P}{4}$

9. If 300 ml a gas a 27ºC is cooled to 7ºC at constant pressure, its final volume will be
(A) 135 ml (B) 540 ml
(C) 350 ml (D) 280 ml

10. At at constant pressure, what should be the percentage increase in the temperature in kelvin for a 10% increase in volume?

(A) 10% (B) 20%
(C) 5% (D) 50%

11. The density of $O_2(g)$ is maximum at

(A) STP (B) 273 K and 2 atm
(C) 546 K and 1 atm (D) 546 K and 2 atm

12. The pressure of sodium vapour in a 1L container is 10 torr at 1000ºC. How many atoms are in container?

(A) 9.7×10^{17} (B) 7.6×10^{19}
(C) 4.2×10^{17} (D) 9.7×10^{19}

13. At 27ºC a sample of ammonia gas exerts a pressure of 5.3 atm. What is the pressure when the volume of the gas is reduced to one tenth of the original value at the same temperature?

(A) 0.53 atm (B) 5.3 atm
(C) 53 atm (D) None of these

14. 32 g of oxygen and 3g of hydrogen are mixed and kept in a vessel at 760 mm pressure and 0ºC. The total volume occupied by the mixture will be nearly

(A) 22.4 litre (B) 11.2 litre
(C) 44.8 litre (D) 56 litre

15. A gas is found to have a density of 1.80g/litre at 1 atm pressure and 27ºC. The gas will be

(A) N_2 (B) CO
(C) CO_2 (D) SO_2

16. If the density of a gas A is 1.5 times that of B, the molecular mass of gas A is M. The molecular mass gas B will be (assume other conditions are same)

(A) 1.5 M (B) $\frac{M}{1.5}$
(C) 3M (D) $\frac{M}{3}$

17. If P is pressure and d is the density of gas then P and d are related as

(A) $P \propto d$ (B) $P \propto d^2$
(C) $P \propto \frac{1}{d}$ (D) $P \propto \frac{1}{d^2}$

18. The pressure of 2 mol of ideal gas at 546 K having volume of 44.8 L is

(A) 2atm (B) 3 atm
(C) 4 atm (D) 1 atm

19. A gaseous mixture contains 56g N_2, 44 g CO_2 and 16g CH_4. The total pressure of the mixture is 720 mm Hg. The partial pressure of CH_4 is

(A) 360 mm of Hg (B) 180 mm of Hg
(C) 440 mm of Hg (D) 120 mm of Hg

20. A gaseous mixture containing 2g H_2, 8g He, 22 g CO_2 and 8 g O_2 is enclosed in a vessel. The gas with highest partial pressure is

(A) He (B) H_2

(C) CO_2 (D) O_2

21. The ratio of the root mean square velocity of H_2 at 50 K and that of O_2 at 800 K is

(A) 4 (B) 2

(C) 1 (D) $\frac{1}{4}$

22. The average velocity of an ideal gas molecule at 27ºC is 0.5m/s, the average velocity at 927ºC will be

(A) 1m/s (B) 0.3 m/s

(D) 1.5 m/s (D) 2m/s

23. Kinetic energy per mole of an ideal gas

(A) Is proportional to temperature

(B) Independent of temperature

(C) Directly proportional to the square root of temperature

(D) Is zero at 0ºC

24. The average velocity of a gas molecule is 400 m/s. The rms velocity at the same temperature will be

(A) 550 m/s (B) 434 m/s

(C) 750 m/s (D) 350 m/s

25. A container contains O_2 and N_2 in equal molar concentration at same temperature, what is the correct statement about the average molar kinetic energy of the two gases?

(A) Depends upon volume (B) $KE_{N_2} = KE_{O_2}$

(C) $KE_{N_2} > KE_{O_2}$ (D) $KE_{N_2} < KE_{O_2}$

26. The r.m.s. velocity of hydrogen is $\sqrt{7}$ times the r.m.s. velocity of nitrogen. If T is the temperature of gas, then

(A) $T_{(H_2)} = T_{(N_2)}$ (B) $T_{(H_2)} > T_{(N_2)}$

(C) $T_{(H_2)} < T_{(N_2)}$ (D) $T_{H_2} = \frac{T_{N_2}}{4}$

27. According to kinetic theory of gases, the gases exert the pressure due to

(A) Collision of gas molecules

(B) The random movement of gas molecules

(C) The intermolecular forces of attraction between the gas molecules

(D) The collision of gas molecules against the walls of container

28. At what temperature, the translational kinetic energy of 14 g of nitrogen will be the same as that of 32 gm of oxygen at 300 K?

(A) 150 K (B) 300 K

(C) 600 K (D) 900 K

29. Nitric oxide gas at 2.0 atm. And oxygen gas at 1 atm are injected simultaneously through pinhole of identical area of cross section at the opposite end of a circular glass tube. The length of tube is 1.0m and gases are kept at same temperature. Determine the distance from O_2 end at which first flash of shown fume would be observed

(A) 0.11 m
(B) 0.33 m
(C) 0.85 m
(D) 0.67 m

30. 50 ml of hydrogen diffuse through a small hole from a vessel in 20 minutes. Time taken for 40 ml of oxygen to diffuse under similar conditions through a same hole will be

(A) 12 minutes
(B) 64 minutes
(C) 8 minutes
(D) 32 minutes

31. The rate of diffusion of methane is twice that of gas x, when diffuse through same hole under all identical conditions. The molecular mass of gas x is

(A) 16
(B) 32
(C) 80
(D) 64

32. Compressibility factor for an ideal gas is

(A) 1.5
(B) 1.0
(C) 2.0
(D) ∞

33. In van der Wall's equation of state for a non-ideal gas, the term that accounts for intermolecular forces is

(A) (V – b)
(B) RT
(C) $\frac{a}{V^2}$
(D) $(RT)^{-1}$

34. The unit of van der Waal's constant 'a' is

(A) atm litre mol^{-1}
(B) atm $litre^2$ mol
(C) atm $litre^2$ mol^{-2}
(D) litre mol^{-1}

35. A real gas will approach ideal behavior at

(A) Low temperature and low pressure
(B) High pressure and low temperature
(C) High temperature and high pressure
(D) High temperature and low pressure

36. The value of compressibility factor (Z) at extremely high pressure is

(A) 1
(B) 0
(C) > 1
(D) < 1

37. The ratio $\left(\frac{a}{b}\right)$ (a and b being the van der Waal's constants of real gases) has the units of

(A) atm mol^{-1}
(B) L mol^{-1}
(C) atm L mol^{-1}
(D) atm L mol^{-2}

38. Select the incorrect statement about van der Waal's constant b

(A) Unit is litre mol^{-1}
(B) It depends on intermolecular forces
(C) It is equal to four times the actual volume of gas molecules
(D) It is also called co-volume

39. Consider a real gas placed in a container. If the intermolecular attractions are supposed to disappear suddenly which of the following would happen?
(A) The pressure decreases
(B) The pressure increases
(C) The pressure remains uncharged
(D) The gas collapses

40. At low pressure, the van der waal's equation is written as $\left(P+\frac{a}{V_m^2}\right)V_m = RT$ The compressibility factor is then equal to
(A) $\left(1-\frac{a}{RTV_m}\right)$
(B) $\left(1-\frac{RTV_m}{a}\right)$
(C) $\left(1+\frac{a}{RTV_m}\right)$
(D) $\left(1+\frac{RTV_m}{a}\right)$

41. 80 mL of O_2 takes 2 minutes to pass through the hole. What volume of SO_2 will pass through the hole in 3 minutes under all identical conditions?
(A) $\frac{120}{\sqrt{2}}$
(B) $120\sqrt{2}$
(C) $\frac{12}{\sqrt{2}}$
(D) None of these

42. The rate of effusion of Hydrogen gas at 880 torr and 227°C is 8 torr min^{-1}. What will be the rate of effusion of oxygen gas at a pressure of 1760 torr and temperature of 227°C?
(A) 8 torr/min
(B) 11.312 torr/min
(C) 4 torr/min
(D) 16 torr/min

43. Rate of diffusion is directly proportional to
(A) Temperature
(B) Partial pressure
(C) Molar mass of gas
(D) All of these

44. An ideal gas cannot be liquefy because
(A) The intermolecular forces of attraction between the gaseous molecules are negligible
(B) The critical temperature is very high
(C) The van der Waal's constant a and b are very high
(D) All of these

45. When a compressed gas is allowed to expand through a porous plug at a temperature above its inversion temperature, there is
(A) A fall in temperature
(B) A rise in temperature
(C) Neither a fall or nor a rise in temperature
(D) A fall in temperature first, followed by a rise

46. Which of the following gases can be liquefied easily?
(A) N_2
(B) O_2
(C) H_2
(D) NH_3

47. Boyle temperature is given by

(A) $T_B = \frac{a}{Rb^2}$ (B) $T_B = \frac{a}{Rb}$

(C) $T_B = \frac{a}{27b^2}$ (D) $T_B = \frac{b}{aR}$

48. When a drop of liquid splits up into a number of drops
(A) The volume increases
(B) Energy is liberated
(C) The surface area increases and energy is absorbed
(D) The area decreases and no energy exchanged

49. The critical constants for water are 374ºC, 218 atm and 0.0566 L mol^{-1}. Then
(A) Van der Waal constant a = 0.189 L mol^{-1}
(B) van der Waal constant b = 0.0189 L mol^{-1}
(C) van der Waal constant b = 2.095 L mol^{-1}
(D) At critical point z = $\frac{8}{3}$

50. However higher the pressure, a gas cannot liquefied above its
(A) Boyle's temperature (B) Inversion temperature
(C) Critical temperature (D) Room temperature

51. The average kinetic energy associated with one mole of a gas is

(A) $\frac{3}{2}RT$ (B) $\frac{3}{2}KT$

(C) $\frac{1}{2}RT$ (D) $\frac{1}{2}KT$

52. 0.2 g of a gas X occupies a volume of 0.44 litre at given pressure and temperature. Under identical conditions of P and T, 0.1 g of CO_2 gas occupies 0.32 L volume. The gas X can be
(A) O_2 (B) SO_2
(C) NO (D) C_4H_{10}

53. A sample of gas at constant temperature occupies 95 cm^3 under a pressure of 9.962×10^4 N/m^2. At the same temperature, its volume at a pressure of 10.13×10^4 N/m^2 is
(A) 190 cm^3 (B) 93cm^3
(C) 46.5 cm^3 (D) 47.5 cm^3

54. 200 ml of He at 0.66 atm pressure and 400 ml of O_2 at 0.52 atm pressure are mixed in a 400 ml vessel at 25ºC. The partial pressure of He and O_2 will be
(A) 0.33, 0.52 (B) 0.52, 0.33
(C) 0.22, 0.45 (D) None of these

55. Two identical bulbs containing ideal gases A and B are taken. Density of A is twice that of B. Mol wt. of A is half that of B. If the two gases are at the same temperature, the ratio of pressure of A & B is
(A) 1: 2 (B) 1 : 4
(C) 4 : 1 (D) 2 : 1

56. At what temperature, the average speed of gas molecules will be double that at 27ºC?

(A) 27ºC (B) 327ºC

(C) 527ºC (D) 927ºC

57. At relatively high pressure, van der Waal's equation reduces to

(A) $PV_m = RT$ (B) $PV_m = RT - a / V_m^2$

(C) $PV_m = RT + Pb$ (D) $PV_m = RT - a/V_m$

58. Critical temperature and critical pressure value of four gases are given

Gas	Critical Temp. (K)	Critical Pressure (atm)
P	5.1	2.2
Q	33	13
R	126	34
S	135	40

Which of the following gas(es) cannot be liquefied at a temperature 100 K and pressure 50 atm?

(A) S only (B) P only

(C) R and S (D) P and Q

59. Two samples of gases A and B are at the same temperature. The molecules of A are travelling four times faster than the molecules of B. The ratio of $\frac{m_A}{m_B}$ of their masses will be

(A) 16 (B) 4

(C) 1/4 (D) 1/16

60. Select the order of following temperatures for a gas

(A) Boyle's temperature

(B) Critical temperature

(C) Inversion temperature

(A) A > C > B (B) B > A > C

(C) A > B > C (D) C > A > B

ANSWER KEY

1. (C)
2. (A)
3. (C)
4. (B)
5. (B)
6. (C)
7. (B)
8. (C)
9. (D)
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55. (C)
56. (D)
57. (C)
58. (D)
59. (D)
60. (D)

Note - If you have any query/issue

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