States of Matter

1. The approximate energy required to break $^{+}AB^{-}$ type ionic crystal into its ions is in the range of

1) 10 to 100 kJ/mole 2) 50 to 150 kJ/mole

3) 500 to 1000 kJ/mole 4) 2 to 50 kJ/mole

2. Ion-dipole attractions are present in

1) Water 2) NaCl + Water 3) Benzene 4) All

3. In ion-dipole forces, the magnitude of the interaction energy (E)

1) $E = \frac{Z^2\mu}{r^2}$ 2) $E = \frac{Z\mu}{r}$ 3) $E = \frac{Z\mu^2}{r^2}$ 4) $E = \frac{Z\mu}{r^2}$

4. The energy order of dipole-dipole forces is

1) 1 to 2 kJ/mole 2) 3 to 4 kJ/mole 3) 10 to 20 kJ/mole 4) 15 to 25 kJ/mole

5. Regarding dipole - dipole attractions the incorrect statement is

1) Dipole - dipole attractions are more, if the molecules have high dipole moment values.

2) In liquid HBr, dipole - dipole attractions are present.

3) Dipole - Dipole interaction energy between stationary polar molecules as in solids $\alpha \frac{1}{r^3}$

4) Dipole - dipole interaction energy between rotating molecules $\alpha \frac{1}{r^3}$.

6. London forces arises

1) Due to instantaneous dipole on one atom of a molecule

2) Due to permanent dipole on one atom of a molecule

3) Due to the presence of charge on each ion of a molecule

4) None

7. The average energy of London forces is

1) 1 to 2 kJ/mole 2) 1 to 10 kJ/mole

3) 10 to 20 kJ/mole 4) 20 to 30 kJ/mole

8. F_2 is gas but I_2 is solid, because

1) Larger London forces are present in I_2 when compared with F_2

2) Lesser number of London forces are present in I_2 when compared with F_2

3) F_2 and I_2 have same extent of London forces.

4) I_2 has low bond dissociation energy

9. The melting point of four substances are given in bracket then the attraction forces in a solid is more in case of

1) Ice (273 K) 2) NaF (1270 K)

3) Phosphorous (317 K) 4) Naphthalene (353 K)

10. If thermal energy predominates over intermolecular forces, then the substance changes from ..... to.....

1) Gas to liquid 2) Liquid to solid 3) Gas to solid 4) Liquid to gas

11. The intermolecular force of attraction present between NH_3 and C_6H_6 are

1) Dipole – dipole 2) Ion – dipole

3) Dipole - induced dipole 4) Dispersion

12. Hydration of different ions is an example of

1) Ion - dipole interaction 2) Dipole - dipole interaction

3) Dipole - induced dipole 4) Dispersion

13. The inter molecular forces present in inert gases are

1) Ion – ion 2) Ion – dipole 3) Dipole – dipole 4) Dispersion

14. The term Van der Waals forces refers to

1) Dipole – dipole interaction 2) Dipole – induced dipole

3) Dispersion forces 4) All the above

15. The interactions that are results of temporary dipoles induced in the ordinarily non-polar molecules are

1) Dispersion forces 2) Dipole – dipole

3) Dipole induced dipole 4) Hydrogen bonding

16. When sodium metal is dropped in liquid NH_3, it forms Na^+ and gets ammoniated. Which of the following forces are responsible for the formation of ammoniated sodium ion?

1) Ion – induced dipole 2) Dipole – dipole

3) Ion – dipole 4) Dipole – induced dipole

17. Non polar compounds can also solidify because of

1) Van der waals forces 2) Dipole – dipole interaction

3) Ionic bonds 4) Hydrogen bonds

18. Inter molecular forces in solid hydrogen are

1) Covalent forces 2) Vander Waals forces 3) Hydrogen bond 4) All

19. The value of the universal gas constant R depends upon the

1) Nature of the gas 2) Mass of the gas

3) Temperature of the gas 4) The units of measurement

20. The SI unit of pressure is Pascal and it is equal to the pressure exerted by

1) A mass of 10.2 gram on 1.00 cm^2 area

2) A mass of 1.02 gram on 1.00 cm^2area

3) A mass of 1.02 mg on 1.00 cm^2 area

4) A mass of 10.2 mg on 1.00 cm^2 area

21. What is the value of gas constant R in J mol^{-1} K^{-1}?

1) 82.1 2) 8.314×10^7 3) 8.314 4) 0.0821

22. 'n' moles of an ideal gas at temperature "T" occupy 'V' liters of volume, exerting a pressure of 'P' atmospheres. What is its concentration in mole lit^{-1} (R = gas constant)

1) RT/P 2) P/RT 3) R/P 4) R/PT

23. According to Avogadro's law the correct statements are

a) Volume of gas is proportional to the no. of moles at constant T and P

b) The pressure of a gas is directly proportional to temp. Of the gas under all conditions

c) Equal volumes of different gases under similar conditions consist of equal no. of molecules

d) Equal volumes of different gases under same conditions have equal no. of atoms

1) b, c 2) a, c 3) d, b 4) c, d

24. Assertion (A): At 273K and 0.5 atms pressure 1L of H_2 and 1L of CO_2 contain same number of molecules

Reason (R): Equal volumes of all gases contain equal number of molecules under the same conditions of temperature and pressure

1. Both A and R are true, R is correct explanation to A.
2. Both A and R are true, R is not correct explanation to A.
3. A is true but R is false.
4. A is false and R is true.

25. Which of the following changes cannot increase the volume of a gas by 4 times?

1) T is doubled, P is decreased to half

2) P is kept constant; T is increased by 4 times

3) 't' is doubled, P is decreased to half

4) 't' is kept constant, P is decreased to 1/4 th

HINT: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

26. Value of R in SI units is

1) 8.315×10^7 erg K^{-1} $mole^{-1}$ 2) 8.315J K^{-1} $mole^{-1}$

3) 0.0823 lit.atm.K^{-1} $mole^{-1}$ 4) 2 cal K^{-1} $mole^{-1}$

27. Which of the following is independent of temperature of a gas

1) Density 2) Rate of diffusion 3) Molecular weight 4) Volume

28. The gas constant R represents work done

1) Per molecule 2) Per Degree absolute 3) Per Degree per mole 4) Per mole

29. Ideal gases obey Gas Laws at

1. Low T, low P 2. Low P, high T 3. High P, Low T 4. At all P&T's

30. A real gas show deviation from ideal behavior at

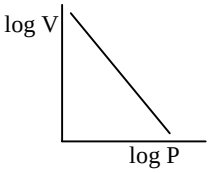
1) High temperature and Low pressure

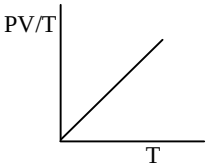
2) High pressure and Low temperature

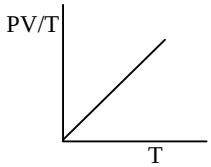
3) High pressure and High temperature

4) Low pressure and Low temperature

31. The Boyle's law can be expressed graphically as

1)) 

2) 

3) 

4) All of these

32. When the pressure on a gas is decreased to 1/4 and the absolute temperature is increased four-fold the volume of the gas

1) Increases by 16 times 2) Decreases to 1/16

3) Increases by 8 times 4) Remains the same

Hint: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

33. The temperature of a gas is increased by 1°C. Then from the following statements pick out the correct one

a) The volume increases by 1/273 of its volume at 0°C at constant pressure

b) The pressure increases by 1/273 of its pressure at 0°C at constant volume

c) The volume decreases by 1/273 of its volume at 0°C

d) The pressure is doubled to its pressure at 0°C

1) a, c 2) c, d 3) a, b 4) b, c

34. Which of the following are correct statements?

a) 760 torr is equal to 1atmosphere b) 10^6 dynes/cm^2 is called 1 Bar

c) 10^5 Newtons/m^2 is pascal d) 1 atmosphere is 1.013 x 10^5 dynes/m^2

1) a, c 2) a, b 3) a, d 4) c, d

35. 1 mole of any gas

a) Occupies 22.4 lit at STP

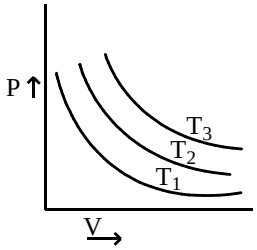
b) Contains $3.05x10^{22}$ molecules

c) Contains 6.023×10^{23} molecules

d) Contain same number of molecules as in 22 gm of CO_2

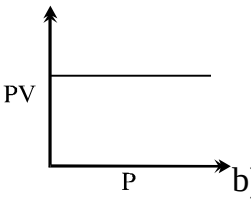
1) b, d 2) a, c 3) b, c 4) a, d

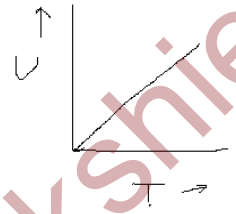
36. From the graph the correct order of temperatures is

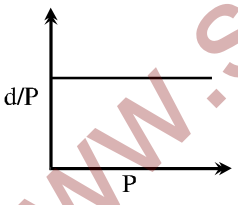


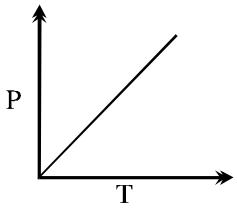
1) $T_3 > T_2 > T_1$ 2) $T_3 < T_2 < T_1$ 3) $T_3 = T_2 = T_1$ 4) $T_3 > T_2 < T_1$

37. Which of the following indicates the isotherms?

a) 

b) 

c) 

d) 

1) a, d 2) a, c 3) b, d 4) b, c

38. Which of the following indicates Charles's law mathematically (when n, P are constant)?

a) VT = constant b) $V_t = V_0\left(1+\frac{t}{273}\right)$

c) $V_0 = V_t\left(1+\frac{t}{273}\right)$ d) V/T = constant (when n, P are constant)

1) a, c 2) a, b 3) b, c 4) b, d

39. At absolute zero which of the following statements about an ideal gas are correct?

a) The motion of gaseous molecules ceases

b) The volume of gas increases by 273 times

c) The K.E of gas molecules increases ab normally

d) The volume of a gas becomes zero

1) b, d 2) b, c 3) c, d 4) a, d

40. A gas of volume 2000ml is kept in a vessel at a pressure of 10^6 Pascal's at a temperature of 27°C. If the pressure is increased to 10^4 Pascal's at the same temperature, the volume of the gas becomes

1) 1000ml 2) 20ml 3) 2ml 4) 200ml

Hint: $P_1 V_1 = P_2 V_2$

41. At a constant temperature a gas is initially at 2 atm pressure. To compress it to 1/8th of its initial volume, pressure to be applied is

1) 4atm 2) 8atm 3) 12atm 4) 16atm

Hint: $P_1 V_1 = P_2 V_2$

42. The volume of a given mass of a gas is 100ml at 100^0C. If pressure is kept constant at what temperature will the sample have the volume of 200ml?

1) 50°C 2) 473°C 3) 200°C 4) 400°C

Hint: $\frac{V_1}{T_1}=\frac{V_2}{T_2}$

43. At what temperature, the volume of 'V' of a certain mass of gas at 37°C will be doubled, keeping the pressure constant?

1) 327°C 2) 347°C 3) 527°C 4) 54°C

Hint: $\frac{V_1}{T_1}=\frac{V_2}{T_2}$

44. One litre of a gas weights 2g at 300 K and 1atm. pressure. If the pressure is made 0.75 atm, at which temperature will one litre of the same gas weights 1g

1) 600K 2) 800K 3) 900K 4) 450K

Hint: $\frac{P_1}{w_1T_1}=\frac{P_2}{w_2T_2}$

45. The total pressure of a mixture of 8g of oxygen and 14g of nitrogen contained in a 11.2L vessel at 0°C is.

1) 0.5 atm 2) 1 atm 3) 1.5 atm 4) 2 atm

Hint: PV=nRT

46. The density of a gas is 2.5g/L at 127°C and 1 atm. The molecular weight of the gas is

1) 82.1 2) 41.05 3) 56 4) 28

Hint: PM=dRT

47. The molar volume of an ideal gas at one atmosphere and 273°C is

1) 22.4L 2) 44.8L 3) 11.2 L 4) 5.6 L

Hint: pv=nRT

48. The density of a gas is 2g/L at 1 atm and 27°C. The density of the same gas at 2 atm and 127°C is

1) 3g/L 2) 1.33g/L 3) 2 g/L 4) 1g/L

Hint: $\frac{d_1T_1}{P_1} = \frac{d_2T_2}{P_2}$

49. How much should the pressure be increased in order to decrease the volume of a gas by 5% at constant temperature?

1) 25% 2) 10% 3) 4.26% 4) 5.26%

Hint: $P_1 V_1 = P_2V_2$

50. 16gm of oxygen and 3gm of hydrogen are present in a vessel at 0°C and 760mm of Hg pressure. Volume of the vessel is

1) 22.4 L 2) 44.8 L 3) 11.2 L 4) 5.6 L

Hint: pv=nRT

51. If the pressure and absolute temperature of 4 litres of SO_2 gas are doubled, the volume of this gas would be

1) 1 litre 2) 4 litres 3) 2 litres 4) 8 litres

Hint: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

52. For a given mass of gas, if pressure is reduced to half and the absolute temperature is increased two times, then the volume would be become?

1) V/4 2) 4V 3) $2V^2$ 4) 6V

Hint: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

53. When the pressure of 2 litres of CO_2 gas is doubled and its temperature is also doubled from 200K to 400K, the final volume of the gas is

1) 4 lit 2) 20 lit 3) 40 lit 4) 2 lit

Hint: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

54. If one mole of a gas A (mol.wt-40) occupies a volume of 20litres, under the same conditions of temperature and pressure the volume occupied by 2 moles of gas B (mol. wt=80) is

1) 80 L 2) 60 L 3) 50 L 4) 40 L

Hint: $V_1/ n_1 = V_2/ n_2$

55. Four one litre flasks are separately filled with gases O_2, F_2, CH_4 and CO_2 under same conditions the ratio of number of molecules in these gases

1) 2:2:4:3 2) 1:1:1:1 3) 1:2:3:4 4) 2:2:3:4

Hint: Avogadro's law; equal volumes of all gases contain equal no. of molecules under same conditions of P&T.

56. The weight of one litre of a gas at 1atm. Pressure and 300K is 4g. At what temperature the weight of the gas is 4g when the pressure is made 0.5 atm and volume is 1 litre?

1) 200K 2)150K 3) 600K 4) 1200K

Hint: $\frac{P_1}{w_1T_1} = \frac{P_2}{w_2T_2}$

57. The Molecular weight of a gas is 40. At 400K if 120 g of this gas has a volume of 20 litres, the pressure of the gas in atm is

1) 4.92 2) 5.02 3) 49.6 4) 0.546

Hint: pv= (w/M) RT

58. At 127^0C and 1atm. pressure, a mixture of a gas contains 0.3 mole of N_2, 0.2 mole of O_2. The volume of the mixture is

1) 15 lit 2) 22.4lit 3) 18.2lit 4) 16.4lit

59. 'x' moles of N_2 gas at S.T.P. conditions occupy a volume of 10 litres, then the volume of '2x' moles of CH_4 at 273^0C and 1.5 atm is

1) 20 lit 2) 26.6 lit 3) 5 lit 4) 16.6 lit

Hint: $V_1/ n_1= V_2/ n_2$

60. A gaseous mixture containing 0.35g of N_2 and 5600 ml of O_2 at STP is kept in a 5 litres flask at 300K. The total pressure of the gaseous mixture is

1) 1.293atm 2) 1.2315atm 3) 12.315atm 4) 0.616atm

Hint: pv=nRT, $n_{1=}$w/M= 0.35/28=0.125, n_2 =5600/22400=0.25, n=n1+n2

61. Balloons of 4L capacity are to be filled with Hydrogen at a pressure of 1 atm and 27ºC from an 8L cylinder containing Hydrogen at 10 atm at the same temperature. The number of balloons that can be filled is

1) 20 2) 18 3) 40 4) 38

Hint= $no.ofballons = \frac{V_1(P1-P2)}{P2V2}$ where p_1, p_2 are pressures of gas in cylinder and balloons, $V_{1and}V_2$ are pressures of gas in cylinder and balloons respectively.

62. A steel cylinder of 8 litres capacity contains hydrogen gas at 12atm pressure. At the same temperature how many balloons of 4 litres capacity at 2 atm can be filled up with this gas?

1) 12 2) 48 3) 5 4) 10

63. An open vessel at 27ºC is heated until three-fourths mass of the air in it has been expelled. Neglecting the expansion of the vessel, the temperature to which the vessel has been heated is

1) 927ºC 2) 108ºC 3) 1000ºC 4) 477ºC

Hint: $n_1T_1 = n_2 T_2$,

Where n_1=1, n_2=moles left= 1-3/4= 1/4

64. An open flask has Helium gas at 2atm and 327°C. The flask is heated to 527°C at the same pressure. The fraction of original gas remaining in the flask is

1) 3/4 2) 1/4 3) 1/2 4) 2/5

Hint: $n_1T_1 = n_2 T_2$

65. A gas cylinder withstands a pressure of 14.9 atm. Its pressure gauze indicates 12atm. at 27°C.If the building catches fire suddenly, at what temperature the cylinder explodes?

1) 9.95°C 2) 0.995°C 3) 1.990°C 4) 99.5°C

Hint: $p_1/ T_1 = p_2/ T_2$,

KEY

1) 3	2) 2	3) 4	4) 2	5) 4	6) 1	7) 2	8) 1	9) 2	10) 4
11) 4	12) 1	13) 4	14) 4	15) 1	16) 3	17) 1	18) 2	19) 4	20) 4
21) 3	22) 2	23) 2	24 1	25) 3	26) 2	27) 3	28) 3	29 4	30) 2
31) 4	32) 1	33) 3	34) 2	35) 2	36) 1	37) 2	38) 4	39) 4	40) 2
41) 4	42) 2	43) 2	44) 4	45) 3	46) 1	47) 2	48) 1	49) 4	50) 2
51) 2	52) 2	53) 4	54) 4	55) 2	56) 2	57) 1	58) 4	59) 2	60) 1
61) 2	62) 4	63) 1	64) 1	65) 4					