1. The equivalent weight of $MnSO_4$ is half of its molecular weight when it is converted to
   1) Mn_2O_3 2) MnO_2 3) MnO_4^- 4) MnO_4^{2-}
2. On reduction 1.644 gm of hot iron oxide give 1.15 gm of iron. Evaluate the equivalent weight of iron
   1) 18.62 2) 19.13 3) 18.95 4) 12.95
3. What is the $[OH^-]$ in the final solutionprepared by mixing 20.0 mL of 0.050 m HCl with 30.0 mL of $0.10\,M\ Ba(OH)_2$?
   1) 0.40 M 2) 0.0050 M 3) 0.12 M 4) 0.10 M
4. An ore contains 2.0% by wt. of themineral argentite (Ag_2S). How much of ore should be taken to produce 1.0 g pure Ag?
   1) 45.7 g 2) 67.4 g 3) 57.4 g 4) 87.6 g
5. The number of moles of oxygen in one litre of air containing 21% oxygen by volume, under standard conditions are
   1) 0.0093 mole 2) 0.21 mole
   3) 2.10 mole 4) 0.186 mole
6. The number of water molecules present in a drop of water (volume 0.0018ml) at room temperature is
   1) 1.084×10^{18} 2) 6.023×10^{19}
   3) 4.84×10^{17} 4) 6.023×10^{23}
7. The simplest formula of a compound containing 50% of element X (atomic mass 10) and 50% of element Y (atomic mass 20) is
   1) XY 2) XY_3 3) X_2Y 4) X_2Y_3
8. A compound contains atoms of three elements as A, B and C. If the oxidationnumber of A is +2, B is +5 and that of C is -2, the possible formula of the compound is
   1) $A_3(B_4C)_2$ 2) $A_3(BC_4)_2$
   3) ABC_2 4) $A_2(BC_3)_2$
9. In a compound C, H and N atoms are present in 9 : 1: 3.5 by weight. Molecular weight of compound is 108. Molecular formua of compound is
   1) $C_2H_6N_2$ 2) C_3H_4N 3) $C_6H_8N_2$ 4) $C_9H_{12}N_3$
10. In the following reaction
    $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$
    2 mole MnO_2 reacts with 4 mole of HCl to form 11.2 L Cl_2 at STP. Thus, percent yield of Cl_2 is
    1) 25% 2) 50% 3) 100% 4) 75%
11. X ml of H_2 gas diffuses through a hole in a container in 5 seconds. The time taken for hte diffusion of the same volume of the gas specified below under identical conditions is
    1) 10 seconds : He 2) 20 seconds : O_2
    3) 25 seconds CO 4) 55 seconds : CO_2
12. When a sample of gas is compressed at constant temperature from 15 atm to 60 atm, its volume changes from $76\,cm^3$ to $20.5\,cm^3$. Which of the following statements are possible explanations of this behaviour?
    a) The gas behaves non-ideally
    b) The gas dimerises
    c) The gas sis adsorbed into the vessel walls
    1) a, b & c 2) a, b only 3) b & c only 4) a only
13. The rms velocity of hydrogen is $\sqrt{7}$ times the rms velocity of nitrogen. If T is the temperature of the gas, then
    1) $T(H_2) = T(N_2)$ 2) $T(H_2) > T(N_2)$
    3) $T(H_2) < T(N_2)$ 4) $T(H_2) = \sqrt{7}T(N_2)$
14. At what temperature will be rate of diffusion of N_2 be 1.625 times the rate of diffusion of SO_2 at 500ºC.
    1) 273 K 2) 893 K 3) 110 K 4) 173 K
15. At what temperature will be total kinetic energy (KE) of 0.30 mole of He be the same as the total KE of 0.40 mole of Ar at 400 K
    1) 400 K 2) 373 K 3) 533 K 4) 300 K
16. Small droplets of a liquid are usually more sherical in shape than larger drops of the same liquid because
    1) force of surface tension is equal and opposite to the force of gravity
    2) force of surface tension predominates the force of gravity
    3) force of gravity predominates the force of surface tension
    4) force of gravity and force of surface tension act in the same direction and are equal

17. An ideal gas will have maximum density when
1) $P = 0.5\,atm, T = 600K$
2) $P = 2\,atm, T = 150K$
3) $P = 1\,atm, T = 300K$
4) $P = 1\,atm, T = 500K$

18. With the increasing molecular weight of a liquid, the viscosity
1) decreases 2) increases
3) remain constant 4) All are wrong

19. A gas described by van der Waal's equation
i) behaves similar to an ideal gas in the limit of large molar volume
ii) behaves similar to an ideal gas in the limit of large pressure
iii) is characterised by van der Waal's coefficients that are dependent on the identity of hte gas but are independent of the temperature
iv) has the pressure that is lower than the pressure exerted by the same gas behaving ideally
1) i and ii 2) i and iii 3) i, ii and iii 4) ii and iv

20. The liquifaction behaviour of temporary gases like CO_2 approaches that of permanent gases like N_2, O_2 etc., as we go
1) below critical temperature
2) above critical temperature
3) above absolute zero 4) below absolute zero

21. Molar heat capacity of aluminium is $25\,JK^{-1}\,mol^{-1}$. The heat necessary to raise the temperature of 54g of aluminium (Atomic mass 27g mol^{-1}) from 30° C to 50°C is
1) 1.5 kJ 2) 0.5 kJ 3) 1.0 kJ 4) 2.0 kJ

22. $H_2(g) + Cl_2(g) \rightarrow 2HCl(g); \Delta H = -44\,kCal$
$2Na(s) + 2HCl(g) \rightarrow 2NaCl(s) + H_2(g)$;
$\Delta H = -152\,kcal$. For the reaction
$Na(s) + \frac{1}{2}Cl_2(g) \rightarrow NaCl(s)$ $\Delta H = ?$
1) -180 kcal 2) -196 kcal
3) -98 kcal 4) 54 kcal

23. For the reaction $A \rightarrow B; \Delta H = +24kJ/mol$ and $B \rightarrow C; \Delta H = -18kJ/mol$, the decreasing order of enthalpy of A, B and C follows the order
1) A, B, C 2) B, C, A 3) C, B, A 4) C, A, B

24. A system absorbs 10 kJ of heat and does 4 kJ of work. The internal energy of the system
1) increase by 6 kJ 2) decreases by 6 kJ
3) decreases by 14 kJ 4) none of these

25. The volume of enthalpy change (ΔH) for the reaction
$C_2H_5OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$ at 27°C is -1366.5 kJ mol^{-1}. The value of internal energy change for the above reaction at this temperature will be
1) -1369.0 kJ 2) -1364.0 kJ
3) -1361.5 kJ 4) -1371.5 kJ

26. The $\Delta_f H°$ of O_3, CO_2, NH_3 and HI are 142.2, -393.3, -46.2 and +25.9 kJ per mol respectively. The order of their increasing stabilities will be
1) O_3, CO_2, NH_3, HI 2) CO_2, NH_3, HI, O_3
3) O_3, HI, NH_3, CO_2 4) NH_3, HI, CO_2, O_3

27. The heat of combustion of carbon to CO_2 is -393.5 Kj/mol. The heat released upon formation of 35.2 g of CO_2 from carbon and oxygen gas is
1) +315 Kj/mol 2) -31.5 kJ/mol
3) -31.5 Kj/mol 4) +31.5 kJ/mol

28. Two equilibria, $AB \rightleftharpoons A^+ + B^-$ and $AB + B^- \rightleftharpoons AB_2^-$ are simultaneously maintained in a solution with equilibrium constants, K_1 and K_2 respectively. The ratio of $[A^+]$ to $[AB_2^-]$ in the solution is
1) directly proportional to $[B^-]$
2) inversely proportional to $[B^-]$
3) directly proportional to the square of $[B^-]$
4) inversely proportional to the square of $[B^-]$

29. For reaction $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$, the value of K_c at 250°C is $26\,mol^{-1}$ litre. The value of K_P at this temperature will be
1) $0.61\,atm^{-1}$ 2) $0.57\,atm^{-1}$
3) $0.83\,atm^{-1}$ 4) $0.46\,atm^{-1}$

30. In a reaction, $A + 2B \rightleftharpoons 2C$, 2.0 mole of 'A', 3.0 mole of 'B' and 2.0 mole of 'C' are placed in a 2.0 L flask and the equilibrium concentration of 'C' is 0.5 mole/L. The equilibrium constant (K) for the reaction is
1) 0.073 2) 0.147 3) 0.05 4) 0.026

KEY

1	2	**2**	1	**3**	4	**4**	3	**5**	1	**6**	2	**7**	3	**8**	2	**9**	3	**10**	2
11	2	**12**	4	**13**	3	**14**	2	**15**	3	**16**	2	**17**	2	**18**	2	**19**	2	**20**	2
21	3	**22**	3	**23**	2	**24**	1	**25**	2	**26**	3	**27**	3	**28**	4	**29**	1	**30**	3