CLASS: 11th
SUBJECT: CHEMISTRY

SECTION A

Questions 1 to 5 are passage questions:

The solubility of a crystalline compound in water is influenced by two factors i.e., hydration enthalpy and lattice enthalpy. Lattice enthalpy is needed to separate the ions of the crystal lattice. At the same time, energy is released when the ions are dissolved in water. The resultant of theses two opposite forces decide the solubility of the compound.

Q.1 Name the group-1 hydroxide which is highly water soluble.
Q.2 Name the group-2 hydroxide which is highly water soluble.
Q.3 Name the group-1 sulphate which is highly water soluble.
Q.4 Name the group-2 sulphate which is highly water soluble.
Q.5 Li salts are water insoluble. Why?

Questions 6 to 10 are one word answers:

Q.6 Define pH.
Q.7 What is meant by the term 'ionic product of water'.
Q.8 What will happen to the pH of water on increasing the temperature?
Q.9 Which is the most stable carbocation?
Q.10 What is meant by the term 'fractional distillation'?

Questions 11 to 15 are multiple choice questions:

Q.11 Oxidation number of fluorine in OF_2 is:
    (1) +1   (2) +2   (3) -1   (4) -2
Q.12 14 A reducing agent is a substance which can:
    a) accept electrons   b) donate electrons
    c) accept protons   d) denote protons
Q.13 For the reaction $H_2(g) + I_2(g) \leftrightarrow 2HI(g)$, the standard free energy is $\Delta G° > 0$. The equilibrium constant would be:
    a) K=0   b) K >1
    c) K=1   d) K<1
Q.14 Alkali metals dissolve in liquid NH_3 then which of the following observations is not true:

(1) It become paramagentic   (2) Solution turns into blue to solvated electrons

(3) It becomes diamagnetic   (4) Solution becomes conducting

Q.15 The equilibrium constant in a reversible reaction at a given temperature:

(1) Depends on initial concentration of the reactants

(2) Depends on the concentration of the products at equilirnium

(3) Does not depend on the initial concentrations

(4) It is not characteristic of the reaction

Questions 16 to 20 (assertion and reasoning):

In the following questions, a statement of assertion (A) followed by a statement of reason (R) is given. Choose the correct option out of the choices given below for question no. 16 to 20:

(a)   Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.

(b)   Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.

(c)   Assertion is correct, but reason is wrong statement.

(d)   Assertion is wrong, but reason is correct statement.

Q.16   **A :** $K_P = K_C$ for all reactions.

     R : At constant temperature, the pressure of the gas is proportional to the concentration.

Q.17   **A :** The ionization of hydrogen sulphide in water is low in the presence of hydrochloric acid.

     R: Hydrogen sulphide is a weak acid.

Q.18   **A:** Chlorides of Li, Be and Mg are covalent in nature

     R: Li, Be and Mg have large cationic size in the s-block elements

Q.19   **A:** All the carbon atoms of but-2-ene lie in one plane.

     R: All the carbon atoms in but-2-ene are sp^2 hybridised.

Q.20   **A:** $KClO_3$ $KClO_4$ + KCl This is a disporportional type reaction.

     R: The reaction in which one substance oxidise or reduce is known as disproportion reaction.

SECTION B (CARRYING 2 MARKS EACH)

Q.21 What are resonating structures? Give their application to explain stability.

Q.22 Be and Mg donot show flame colouration test. Why?

Q.23 What are lewis acids and bases? Give example.

Q 24 Calculate the total number of angular and radial nodes present in 3p-orbital?

Q 25 Using the equation of state pV=nRT; show that at a given temperature,density of a gas is proportional to gas pressure p.

Q 26 Write the reaction for the preparation of butane by :
  a) Wurtz reaction   b) Kolbe's reaction

Q 27 Draw the cis- and trans- structure of hex-2-ene. Which isomer will have higher boiling point and why?

SECTION C (CARRYING 3 MARKS EACH)

Q.28 The degree of ionization of a 0.1 M bromoacetic acid solution is 0.132. Calculate the pH of the solution and the pK_a bromoacetic acid.

Q.29 The Mn^{3+} ion is unstable in solution and under goes disproportion to give Mn^{2+}, MnO_2 and H^+ ion. Write a balanced ionic equation for the reaction.

Q.30 What happens when
  (i) Sodium metal is droped in water?
  (ii) Sodium metal is heated in free supply of air?
  (iii) Sodium peroxide dissolve in water?

Q 31 Explain the mechanism of nitration of benzene?

Q 32 Predict the major product(s) of the following reactions and explain their formation:

$$H_3C—CH=CH_2 \xrightarrow{benzoyl\ peroxide\ ,HBr} H_3C—CH=CH_2 \xrightarrow{HBr} ?$$

SECTION D (CARRYING 5 MARKS EACH)

Q 33 The first ionization constant of H_2S is 9.0×10^{-8}. Calculate the concentration of HS^- ions in its 0.1M solution and how will this concentration be affected if the solution is 0.1 M in HCl also? It the second dissociation constant of H_2S is 1.2×10^{-13}, calculate the concentration of S^{2-} under both conditions.

Q 34 Balance the following redox reactions by ion-electron method.
  (a) MnO_4^- (aq) + I^- (aq) $\longrightarrow MnO_2$(s) + I_2(s) (in basic medium)
  (b) MnO_4^- (aq) + SO_2(g) $\longrightarrow Mn^{2+}$(aq) + HSO_4^- (in acidic solution)

Q 35 i) Define the following:
    (a) Hyperconjugation   (b) Electromeric effect   (c) Inductive effect
  ii) Draw the resonating structures and resonance hybrid for phenol.

Q 36 i) Write down the reactions involved during the formation of photochemical smog?

ii) Write short notes on:

a)Tropospheric pollution
b)Gaseous pollutants
c)Global warming.

Q 37 Account for the following:

a) Silicon shows a higher covalency than carbon.
b) Silicon forms Si F_6^{2-} ion whereas corresponding chloro compound of silicon
   is not known .
c) Boron does not form B^{3+} ion.
d) Complete the following :
   1) CH_4 (g) + NH_3(g)→i.p.o Pt catalyst at 1500 K ?
   2)$B(OH)_3$ + $2H_2O$→ ?

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