HALF YEARLY EXAM : 2019-20

Class : XII

Subject : CHEMISTRY

Time : 3:00 Hrs.   M.M. : 70

General Instructions :

(i)   All questions are compulsory.

(ii)   Section-A : Q.No. 1 to 20 are very short answer questions (Objective type) and carry 1 marks each.

(iii)   Section-B : Q.No. 21 to 27 are short answer questions & carry 2 marks each.

(iv)   Section C : Q.No. 28 to 34 are long answer questions & carry 3 marks each.

(v)   Section D : Q.No. 35 to 37 are also long answer questions & carry 5 marks each.

(vi)   There is no over all choice. However an internal choice has been provided in two questions of two marks, two questions in three marks and all the three questions of five marks weightage. You ahve to attempt only one of the choice in such questions.

(vii)   Use by table, if needed. Use of calculator is not allowed.

SECTION-A

Read the passage and answer the questions 1 to 5 that follow :

A lead storage battery consists of a lead anode and a grid of lead packed with lead dioxide as the cathode. The electrolyte taken is 39% H_2SO_4 by mass having a density of 1.294 g ml.$^{-1}$. The battery holds 3.5 L of the acid. During the discharge of the battery, the density H_2SO_4 falls from 1.294 g ml^{-1} to 1.139 g. ml^{-1} which is 20% H_2SO_4 by mass.

(i)   The reaction occuring at the anode, during charging is :

    (a) $PbSO_{4(s)} + 2e^- \rightarrow Pb_{(s)} + SO_4^{--}(ag)$

    (b) $Pb^{++} + SO_4^{--} \rightarrow Pb SO_4$

    (c) $Pb \rightarrow Pb^{++} + 2e-$

    (d) $PbSO_4 + 2H_2O \rightarrow 2PbO_2 + 4H^+ + SO_4^{--} + 2e^-$

(ii)   How much charge is required to carry reduction of 1 mole PbO2 during discharge of the battery.

(iii)   What is the molarity of solution, after discharge.

(iv)   Why is lead storage battery called secondary cell?

(v)   Write the products of electrolysis when dit H_2SO_4 is electrolysed using Pt electrodes.

Questions 6 to 10 are one word answers :

6.   Name the medical condition when a scuba diver comes to the surface from deep sea which causes formation of Nitrogen bubbles in the blood. He/She suffers from pain.

7.   Ethanol can be separated from its aguous mixture by fractional distillation, upto its azeotropic composition. What % by volume of ethanol can be separated.

8.   Give an example of solid solution in which the solute is a gas.

9.   What is the unit of k in rate = $K (PCH_3OCH_3)^{3/2}$ where premise is in bar and time in minutes.

10.   In a graph between lnK and $\frac{1}{T}$ what value we get from its slope?

Question 11 to 15 are multiple choice questions :

11.   Which of the following electrolytes will have maximum coagulating value for AgI / Ag+ Sol?

(a) NO_2S (b) Na_3PO_4 (c) Na_2SO_4 (d) NaCl

12.   Electrolytic refinign is used to purify which of the folowing metals?

(a) Cu & Zn   (b) Na_3PO_4 (c) Zr & Ti   (d) Zn & Hg.

13.   A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with NH_3 an unstable trihalide is formed. In this process the oxidation state of nitrogen changes from :

(a) –3 to +3   (b) –3 to 0   (c) –3 to +5   (d) 0 to –3

14. $KMnO_4$ in alkaline medium oxidises I– into

(a) I_2 (b) IO^- (c) IO_3^- (d) IO_4^-

15. IUPAC name of $[Pt(NH_3)_2 Cl(NO_2)]$ is
    (a) Platinum diaminechloronitrite
    (b) Chloronitrito-N ammine platinum (II)
    (c) Diammine chloridonitrito-N-Platinum (II)
    (d) Diammine chloro nitrito -N-Platinate (II)

Questions 16 to 20 :
(a) Both assertion and reason are correct stateemnt & reason is correct explanation of the assertion.
(b) Both assertion and reason are correct but reason is not the correct explanation of the assertino.
(c) Assertion is correct, but reason is wrong statement.
(d) Assertion is wrong but reason is correct statemnt.

16. Assertion: Phosphorous chloride (tri & pente) are not preferred over thionyl chloride for the preparation of Alkyl halide from Alcohols.
    Reason: Phosphorous Chloride gives pure Alkyl Halide.

17. Assertion: KCN reacts with CH_3Cl to form CH_3NC.
    Reason: CN^- is an ansbident nucleophile.

18. Assertion: Boiling points of Alkyl halide decreases in the order :
    $RI > RBr > RCl > RF$
    Reason: Boiling points of alkyl chlorides, Bromides & Iodides are considerably higher there that of the hydrocarbon of comparable molecular mass.

19. Assrtion: Cu can not liberate Hydrogen from acids.
    Reason: Because Cu has positive electrode potential.

20. Assertion: Zr & Hf separation is difficult.
    Reason: Because Zr & Hf belongs to same group of the periodic table.

SECTION-B

21. Define k_f. write its unit.

22. Calculate E_{cell}, at 298K, Pt(s) / Br2 (l) / Br^- (0.010M) || H^+ (0.030M) / H3(9) 1 ba Pt(v) given $E^°_{Br2/Br-}$ = 1.09 V.

23. Explain Van Arkel method, with example.

    OR

    Explain Hall-Heroult process, with example.

24. Give reason for Transition metals (i) showing paramagnetic nature & (ii) forming coloured complexes.
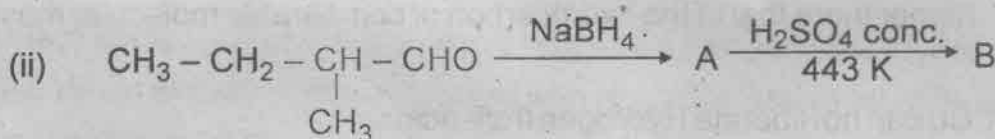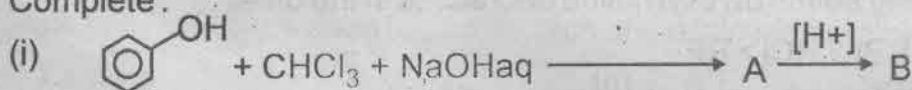
    OR

    What happens when $KNnO_4$ is

    (i) heated.
    (ii) treated with $C_2O_4^{--}$ (oxalateions) in acidic medium. Write chemical equations, involved.

25. Name the linkage isomer of $[Co(NH_3)_5 (NO_2)] (NO_3)_2$. Explain facial & mersidonial isomerism in $[Ma_3b_3]$.

26. Complete:

    (i)
    $$\text{C}_6\text{H}_5\text{OH} + CHCl_3 + NaOHaq \longrightarrow A \xrightarrow{[H+]} B$$

    (ii)
    $$CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CHO \xrightarrow{NaBH_4} A \xrightarrow[443\text{ K}]{H_2SO_4 \text{ conc.}} B$$

27. Write equation : (i) Wilhamison's synthesis
                      (ii) Kolbe's reaction.

SECTION-C

28. A solution of Urea in water has a boiling point of 373.128K. Calculate freezing point of the same solution. given that K_f for water is 1.86 Km^{-1} & Kb for water is 0.52 Km^{-1}.

OR

A solution containing 15g. urea (molar mass $=60$ g. mol^{-1}) per litre of solution has same osmotic pressure as a solution of glucose (molar mass $=180$ g. mol^{-1}) in water. Calculate mass of glucose present in 1L of its solution.

29. Limiting molar conductivities of NaCl, HCl and NaAC are 126.4, 425.9 and 91.0 S cm^2 mol^{-1} respectively. Calculate in for HAC.

OR

Molar conductivity of 0.025 mol L^{-1} MHOOH is 46.15 Cm^2 mol^{-1} calculate degree of dissociation of methanoic acid. Given $m° (H^+) = 349.6$ Scm^2 mol^{-1} and $m° (HCOO^-)$ $= 54.65$ cm^2 mol^{-1}.

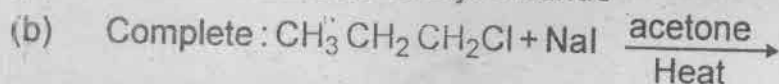30. Explain the terms, with example of each :
    (a) Activity of solid catalysts.
    (b) Selectivity of solid catalyst.
    (c) Shape selective catalysis.

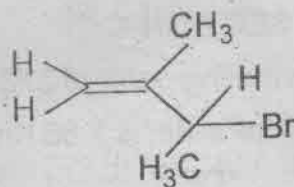31. Account for the following :
    (a) Transition metals form coloured complexes.
    (b) Transition metals form Alloys.
    (c) Zn, Col, Hg are not considered as Transition metals.

32. Primary alkyl halide (A) (C_4H_9Br) reacted with alcoholic KOH to give compound (B). B is reacted with HBr to give (C), which is an isomer of (A). (A) is reacted with sodium metal, in presence of dry ether, to form (D), with molecular formula C_8H_{18} which is different from the product obtained. when n-butyl chloride is reacted wtih sodium. Give structural formula of (A) & write all the equations involved.

33. (a) Convert Tolune to Benzyl Chloride
    (b) Complete : $CH_3 CH_2 CH_2Cl + NaI \xrightarrow[\text{Heat}]{\text{acetone}}$

(c) Write IUPAC name

$$\underset{H_3C}{\overset{H}{\underset{H}{\diagdown}}}C=C\underset{\underset{Br}{\diagup}}{\overset{CH_3}{\overset{\diagup}{\diagdown}}H}$$

34. Give reason :
    (a) D-Nitro phenol is more acidic than D-Methoxyphenol.
    (b) Propanol has higher b.p. than isomeric Hydrocarbons.
    (c) Phenol is more acidic than ethanol.

SECTION-D

35. (a) Following data were obtained during first order thermal decomposition of $N_2O_5(g)$ at constant volume : $2N_2O_5(g) \; 2N_2O_4(g) + O_2(g)$

S.No.	Time (Second)	Total presure (atm.)
1.	0	0.5
2.	100	0.512

Calculate rate constant.

(b) for a first order run, prove that $t_{99\%} = 2t_{90\%}$

OR

(a) Rate constants of a reaction at 500K. & 700 K are 0.02 S^{-1} and 0.075 S^{-1} respectively. Calculate the values of E_a and A.

(b) Prove that, Half life of a zero order reaction is dependant on initial concentration of the reactant.

36. (a) Arrange the following in increasing order of their properties;
    (i) F_2, Cl_2, Br_2, I_2 – Bond Dissociation Enthalpy
    (ii) HF, HCl, HBr, HI – Acidic strength

(b) H_2S is less acidic than H_2TRe, Why?

(c) Why is $Ka1 >> Ka_2$ for H_2SO_4 in water?

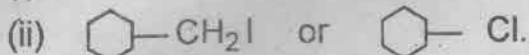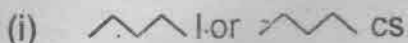(d) Complete : $CaF_2 + H_2SO_4 \longrightarrow$ _____ + _____

OR

(a) What led to the discovery of Xenon compounds?

(b) When HCl reacts with finally divided Iron, it forms ferrous chloride, not ferru Chloride, Why?
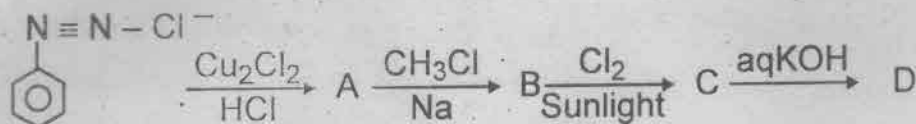
(c) Complete $Cl_2 + NaOH$ (hot & Conc.) _____ + _____ + _____

(d) Write the principle of contact process for manufacturing of sulphuric acid. Write equations.

37. (a) Write the mechanism of $CH_3Br + NaOH_{ag} \rightarrow CH_3O + NaBr_{(ag)}$

(b) Which will undergo SN_2 reaction faster :

(i) $\wedge\wedge$ I or $\sim\wedge$ cs

(ii) $\bigcirc\!-CH_2I$ or $\bigcirc\!-Cl$.

(c) Identify A, B, C & D.

$N \equiv N - Cl^-$
$\bigcirc$ $\xrightarrow[HCl]{Cu_2Cl_2}$ A $\xrightarrow[Na]{CH_3Cl}$ B $\xrightarrow[Sunlight]{Cl_2}$ C $\xrightarrow{aqKOH}$ D

OR

(a) Give reason :

(i) Grignard reagent should be prepared under anhydrous condition.

(ii) Dipole moment of chlorobenzene is lower than cyclothexyl chloride.

(iii) Alkyl halide, though polar, are imiscible with water.

(b) What are ambident nucleophiles? Explain with example.