ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

Pre – Test Examination – 2018

Class :12

Sub :Chemistry   F.M.:70

DURATION:3 Hrs15Mins   DATE:02.08.2018

GROUP – A

1. Answer the following questions: MARKS – 1X14=14

1.1 $E^o_{Fe^{2+}/Pe}$ = -0.441V and $E^o_{Fe^{3+}/Fe^{2+}}$ =0.771V, standard EMF of the reaction

Fe +Fe^{3+} ⟶ 3Fe^{2+} will be-

a) 0.111V b) 0.330V c) 1.653V d) 1.212V

1.2 The specific conductance of a 0.1N KCl solution at 23^oC is 0.012ohm^{-1}cm^{-1}. The resistance of the cell containing the solution at the same temperature was found to be 55 ohm. The cell constant will be-

(a) 0.918cm^{-1} (b) 0.66cm^{-1} (c) 1.140cm^{-1} (d) 1.12cm^{-1}

1.3 If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately-

a) 45 mins b) 60 minutes c) 40 minutes d) 50 minutes

1.4 Enzyme increases the rate of a reaction-

a) By lowering activation energy b) By increasing activation energy c) By changing equilibrium constant d) by forming enzyme substrate complex

1.5 Which of the following compound gives Benzoic acid on hydrolysis-

a) Chlorobenzene b) Benzoyl chloride c) Chlorophenol d) Chlorotoluene

1.6 Sodium formate on heating produces

(a) Oxalic acid and H_2 (b) Sodium oxalate and H_2 (c) CO_2 and NaOH (d) Sodium oxalate

1.7 When Phenol is treated with CCl_4 and NaOH,the product formed-

a) Benzaldehyde b) Salicylaldehyde c) Salicylic acid d) Benzoic acid

1.8 How many isomers of $C_5H_{11}OH$ will be primary alcohols-

a) 5 b) 4 c) 2 d) 3

1.9 Reaction of Mg-Hg/H_2O with acetone produces-

a) Pinacolone b) Pinacol c) Alcohol d) none of the above

1.10 When Phenol is treated with excess bromine water.It gives-

a) m-bromophenol b)o and p-bromophenol c) 2,4-dibromophenol d) 2,4,6-tri bromophenol

1.11 An organic compound A(C_4H_9Cl) on reaction with Na/diethyl ether gives a hydrocarbon which on monochlorination gives only one chloro derivative then, A is

a) t-butyl chloride b) s-butyl chloride c) iso pentyle chloride d) n-butyl chlordie

1.12 Which of the following alcohol gives positive Iodoform test?

a) ethanol b) 1,1-dimethyl ethanol c) Phenol d) Pentan-3-ol

1.13 Reagent used for distinguishing between an aldehyde and a ketone-

a) Tollens reagent b) $NaNO_2/HCl$ c) anhydrous $ZnCl_2/HCl$ d) Na-ethanol

1.14 Industrial preparation of chloroform employs acetone and

a) Phosgene b) calcium hypochlorite c) chlorine gas d) sodium chloride
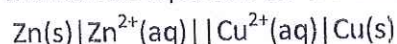
GROUP – B

2. Answer the following questions. (Alternatives are to be noted) :   Marks: 1X4=4

2.1 Although Phenol is an acid, yet it doesn't react with sodium bicarbonate solution. Why?

2.2 Write down the chemical composition of Fehling's solution.

Or

How methyl bromide be preferentially converted to methyl isocyanides?

2.3 What is meant by temperature coefficient of reaction rate?

2.4 Write down the Nernst equation for the following cell reaction:

$$Zn(s)|Zn^{2+}(aq)||Cu^{2+}(aq)|Cu(s)$$

Or

What happens when chloroform reacts with nitric acid?

GROUP-C

3. Answer the following questions. (Alternatives are to be noted) :   Marks: 2X5=10

3.1 A first order reaction takes 40 minutes for 30% decomposition. Calculate T_{50}.

Or

Why we can't determine the order of a chemical reaction by taking into consideration the balanced chemical equation?

3.2 If a current of 0.5A flows through a metallic wire for 2 hours, then how many electrons would flow through the wire?

Or

How many charge is required for the following reduction: 1 mole MnO_4^- to Mn^{2+}?

3.3 Why is sulphuric acid not used during the reaction of alcohols with KI?

Or

Why can't aryl halide not be prepared by the reaction of Phenol with HCl in the presence of anhydrous $ZnCl_2$?

3.4 How will you convert?

i) Phenol to Propan-1-ol, ii) Phenol to Propan-2-ol

3.5 Arrange the following compounds in the ascending order of their reactivity towards nucleophilic addition reaction and also explain the reason.

Ethanal, Propanal, Propanone, Butanone

GROUP-D

4. Answer the following questions. (Alternatives are to be noted) :   Marks: 3X9=27

4.1 i) Mention the function of a salt bridge.

ii) Calculate the potential of hydrogen electrode in contact with a solution whose pH is 10.

1+2

Or

What is threshold energy? Explain the effect of catalyst and inhibitor on the overall rate of a chemical reaction. 1+2=3

4.2 i) The rate of the chemical reaction doubles for an increase of 10K in absolute temperature from 298K. Calculate E_a. 3

4.3 i) Write down the symbolic structure of standard hydrogen electrode.

ii) A cell consists of the following Nernst equation:

$E= E^{\circ} + RT/F \ln [Cu^{2+}] / [Zn^{2+}]$; write down the reaction of the cell. 1+2

Or

i) Write down the Kohlrausch's law.

ii) Zinc rod is dipped in 0.1 M solution of $ZnSO_4$. The salt is 95% dissociated at this dilution at 298K. Calculate the electrode potential. Given: $E^{\circ}_{Zn^{2+}/Zn} = -0.76V$. 1+2=3

4.4 Write short notes on the following reactions:

Reimer-Tiemann Reaction and Williamson's synthesis 3

4.5 Compound A having molecular formula C9H7O2Cl exists in keto form and predominantly in enolic form B On oxidation with KMnO4. A gives m-Chlorobenzoic acid. Identify A and B. 3

Or

An organic compound A having molecular formula C8H16O2 was hydrolysed with dilute sulphuric acid to give a carboxylic acid(B) and alcohol(C). Oxidation of C with Chromic acid produced B. C on dehydration gives but-2-ene. Write chemical equations for the reactions involved. 3

4.6 Why is it necessary to avoid even traces of moisture during the use of Grignard reagent? Arrange the following according to the reactivity order with respect to S_N2 reaction and explain: $CH_3CH_2CH_2Br$, CH_3CH_2Br, $(CH_3)_3CCH_2Br$, $(CH_3)_2CHCH_2Br$ 1+2

4.7 Complete the following reactions:

i) $CH_3CH_2CH=CH_2 + HBr \xrightarrow{Peroxide}$?

ii) $CH_3CH(OH)CH_3 \xrightarrow{I_2/NaOH}$? $\xrightarrow{Ag-powder}$?

Mention the drawbacks of Williamson's synthesis. 2+1

4.8 i) What happens when, Aniline is heated with few drops of chloroform and alcoholic KOH.

ii) Transform the following:

Benzoic acid $\longrightarrow$ Benzamide

Benzaldedyde $\longrightarrow$ Cinnamic acid 1+2

4.9 i) Cholroform is stored in closed dark coloured bottles completely filled, so that air is kept out-explain.

ii) How will you bring about the following conversions?

Benzene to Biphenyl and Bromomethane to Propanone 1+2=3

3

GROUP- E

5. **Answer the following questions. (Alternatives are to be noted)** :   Marks: 5X3=15

5.1 i)Prove that, half-life of a first order reaction doesn't depend upon the initial concentration.

ii) What will be the order of a reaction with rate constant 1.5×10^{-3} $dm^3 mol^{-1}s^{-1}$?

iii) At a fixed temperature half-life of a first order reaction is 3 mins.How much time is required to finish $3/4^{th}$ of that reaction?   2+1+2=5
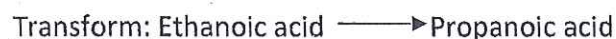
Or

i) Rate constant of a reaction varies with temperature by following the equation:

$\log k = E_a/2.303R(1/T)$, E_a= Energy of activation

if the slope of logK vs 1/T is (-)4686 k,then find out the value of Ea.

ii) To complete 99.9%, a first order reaction takes time of 10 times of its half-life-establish the mathematical relation.

iii) Find out the rate constant of nth order reaction, when concentration of reactant and time is represented by $moldm^{3-}$ and second(s) respectively.   2+2+1=5

5.2 i) How can you chemically distinguish between the two compounds:

a) Ethanol and methanol, b) Acetaldehyde and Acetone, c) Formic acid and acetic acid

ii) Write short notes on the following:

a) Aldol condensation, b) Perkin's reaction   3+2= 5

5.3 i) Why Formaldehyde can't be prepared by Rosenmund reaction?

Give the structures of A, B and C

i) $CH_3CHO \longrightarrow CH_3COOC_2H_5$

ii) $C_6H_5CHO \longrightarrow C_6H_5CH=CHCHO$

iii) $HCHO \longrightarrow (CH_2)_6N_4$

Transform: Ethanoic acid $\longrightarrow$ Propanoic acid   1+1+1+1+1=5

Or

An aromatic compound 'A' on treatment with aqueous ammonia and heating forms compound 'B',which on heating with Br_2 and KOH forms a compound 'C'(C_6H_7N).'C' is soluble in dil HCl. Identify A,B and C.

Give examples of the following reactions (Any Two)

i) Cannizzaro reaction

ii) Fries Rearrangement

iii) Wolff kishner reduction   3+1+1=5

4

ST. LAWRENCE HIGH SCHOOL
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Model Answer of PRE-TEST EXAMINATION– 2018
CLASS – XII

F.M.- 70
DATE -02.08.18

SUBJECT – CHEMISTRY

DURATION – 3 Hours 15mins

MODEL ANSWER

GROUP – A

1. Answer the following questions: MARKS – 1X14=14

1.1 (c) 1.653V

1.2 (b) 0.66cm^{-1}

1.3 (a) 45 mins

1.4 (a) By lowering activation energy

1.5 (d) Chlorotoluene

1.6 (b) Sodium oxalate and H_2

1.7 (c) Salicylic acid

1.8 (a) 5

1.9 (b) Pinacol

1.10(d) 2,4,6-tri bromophenol

1.11 (a) t-butyl chloride

1.12 (a) ethanol

1.13 (a) Tollens reagent

1.14 (c) chlorine gas

GROUP – B

2. Answer the following questions. (Alternatives are to be noted) : Marks: 1X4=4

2.1 Phenol is weakly acidic in nature and requires strong base to react with.

2.2 Fehling's solution is an equi-volume mixture of two solutions, i.e. Fehling's solution A and Fehling's solution B. Fehling's solution A is aqueous copper sulphate and Fehling's solution B is alkaline potassium sodium tartarate (Rochelle salt).

Or

By using aqueous solution of AgCN.

2.3 The term (K_{t+10}/K_t) is called temperature co-efficient of reaction rate. In general, t=25°C.So, $K_{35}{}^{o}{}_{c}/K_{25}{}^{o}{}_{c}$ is called temperature co-efficient of reaction rate. This value lies between 2 and 3, i.e. for 10° rise in temperature, rate of reaction increases by 100% to 200%.

2.4 $E_{cell} = E^{o}{}_{cell} -2.303RT/2Flog[Zn^{2+}]/[Cu^{2+}]$

Or

Chloropicrin is formed (CCl_3NO_2).

3. Answer the following questions. (Alternatives are to be noted) :   Marks: 2X5=10
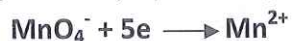
3.1 T_{50}=77.78 min

Or

The rate of reaction may not depend upon all the molecules of a reactant present in the balanced chemical equation. Thus, balanced chemical equation often leads to incorrect order or rate law.

3.2 The requisite number of electrons would be **2.250X10^{22}**

Or

The charge on the manganese is (**+7**) in MnO_4^-. The chemical reaction involved is:

$$MnO_4^- + 5e \longrightarrow Mn^{2+}$$

Therefore, to convert 1 mole of MnO_4^- to Mn^{2+} ions, 5F electricity is required. The amount of charge is therefore, **5X96500C= 482500C**

3.3 Being a strong oxidizing agent sulphuric acid oxidises KI into I_2.

Or

The reaction proceeds via S_N1 mechanism through the formation of a carbocationic intermediate but with phenol carbocationic intermediate can't be obtained.

3.4 How will you convert?

i) Phenol to Propan-1-ol, ii) Phenol to Propan-2-ol

3.5 **Butanone <Propanone <Propanal <Ethanal (Factor:** Electrophilicity of the carbonyl carbon atom**)**

GROUP-D

4. Answer the following questions. (Alternatives are to be noted) :   Marks: 3X9=27

4.1 i) It stops the development of junctional liquid drop potential and also maintains the constant flow of electricity.
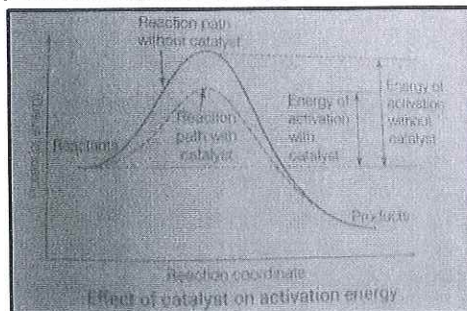
ii) Calculate the potential of hydrogen electrode in contact with a solution whose pH is 10.
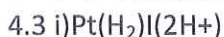
Or

The minimum amount of energy which the reactant must possess in order to convert into products is known as threshold energy.

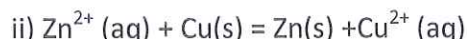Draw the energy profile graph to explain.

Catalyst increases the rate of reaction by lowering down the energy of activation and inhibitor decrease the rate of reaction by enhancing the energy of activation.

Effect of catalyst on activation energy

4.2 i) $E_a = $ **52.898 KJmol^{-1}**

4.3 i) $Pt(H_2)I(2H+)$

   1 Bar   1M $E^o = 0.00V$

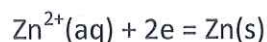ii) $Zn^{2+}(aq) + Cu(s) = Zn(s) + Cu^{2+}(aq)$

<div align="center">Or</div>

i) **Kohlrausch's law:** The equivalent conductivity of an electrolyte at infinite dilution id equal to the sum of tar conductance of the anions and cations. If a salt is dissolved in water, the conductivity of the solution is the sum of the conductances of the cations and anions.

ii)

Cell Reaction:

$Zn^{2+}(aq) + 2e = Zn(s)$

$E = E^o - 0.059/2 \log (1)/[Zn2+]$

$E = (-) 0.76 - 0.059/2 \log 1/(.95 \times 0.1) = (-) 0.79V$

4.4 Write short notes on the following reactions:

  Reimer-Tiemann Reaction and Williamson's synthesis

Refer any standard text book(**Ref:** Reaction of Phenol and preparation of ether respectively)

4.5 Compound A having molecular formula $C_9H_7O_2Cl$ exists in keto form and predominantly in enolic form B On oxidation with $KMnO_4$. A gives m-Chlorobenzoic acid. Identify A and B.

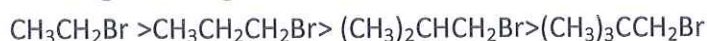<div align="center">Or</div>
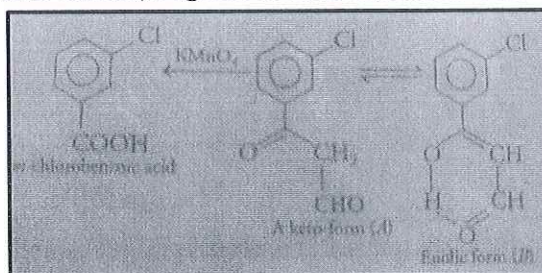
An organic compound A having molecular formula $C_8H_{16}O_2$ was hydrolysed with dilute sulphuric acid to give a carboxylic acid(B) and alcohol(C). Oxidation of C with Chromic acid produced B. C on dehydration gives but-2-ene. Write chemical equations for the reactions involved.
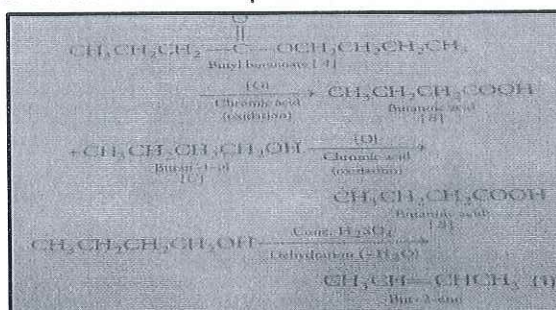
4.6 Grignard reagent reacts with water to form an alkane and basic Magnesium halide.

$CH_3CH_2Br > CH_3CH_2CH_2Br > (CH_3)_2CHCH_2Br > (CH_3)_3CCH_2Br$

4.7 Complete the following reactions:

i) $CH_3CH_2CH=CH_2 + HBr$ $\xrightarrow{\text{Peroxide}}$ $CH_3CH_2CH_2Br$(Anti-Markownikoff addition)

ii) $CH_3CH(OH)CH_3$ $\xrightarrow{I_2/NaOH}$ CHI_3 $\xrightarrow{\text{Ag-powder}}$ C_2H_2(Acetylene or Ethyne)

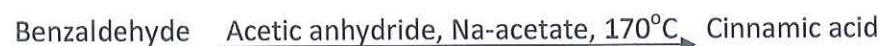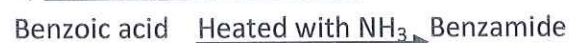**Drawbacks of Williamson's synthesis**:

Williamson synthesis can only be applied to primary alkyl halides.

4.8 i) C_6H_5NC,Phenyl isocyanide(foul odour) is formed.

ii) **Transform the following:**

Benzoic acid $\xrightarrow{\text{Heated with } NH_3}$ Benzamide

Benzaldehyde $\xrightarrow{\text{Acetic anhydride, Na-acetate, } 170^\circ C}$ Cinnamic acid

4.9 i) Because in presence of air and sunlight Chloroform gets converted into poisonous Phosgene gas.

ii) Refer any standard text book.

GROUP- E

5. Answer the following questions. (Alternatives are to be noted) :   **Marks: 5X3=15**

5.1 i) Half-life for 1st order process equals 0.693/K, hence is independent of initial concentration.

ii) From unit of K it is apparent it's a 1st order reaction.

iii) For 1st order process, $t_{3/4}=2Xt_{1/2}$

Or

i) $E_a = 4686X2.303R$ Joule, where $R=8.314JK^{-1}mol^{-1}$

ii) Refer to any standard text book.

iii) Unit of $K= mol^{(1-n)} dm^{(3n-3)} s^{-1}$

5.2 i) a) Iodoform test b) Tollens reagent or Fehling's solution c) Tollen's reagent

ii) Write short notes on the following:

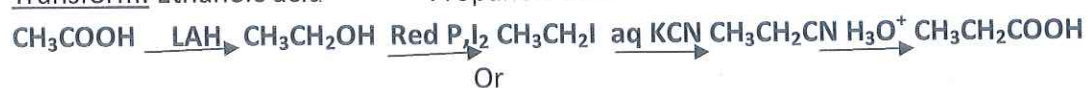a) Aldol condensation, b) Perkin's reaction

Refer any standard text book.

(Ref: Reactions of aldehyde and ketone)

5.3 i) Because,Formyl Chloride(HCOCl) doesn't exist.

A=Aluminium alkoxide

B= Sodium or potassium salt of a carboxylic acid and its anhydride and **C**= Excess Ammonia

<u>Transform:</u> Ethanoic acid   ⟶ Propanoic acid

CH_3COOH $\xrightarrow{LAH}$ CH_3CH_2OH $\xrightarrow{Red\ P,I_2}$ CH_3CH_2I $\xrightarrow{aq\ KCN}$ CH_3CH_2CN $\xrightarrow{H_3O^+}$ CH_3CH_2COOH

<div align="center">Or</div>

A= C_6H_5COOH (Benzoic acid))

B=$C_6H_5CONH_2$ (Benzamide)

C=$C_6H_5NH_2$ (Aniline)

<u>Give examples of the following reactions (Any Two)</u>

i) Cannizzaro reaction

ii) Fries Rearrangement

iii) Wolff kishner reduction

Refer any standard text book.

(**Ref:** Reactions of aldehyde and ketone, Phenol and Reactions of aldehyde and ketone respectively)