BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI, K. K. BIRLA GOA CAMPUS

Mid semester Examination (Close Book) CHE F214 Engineering Chemistry

1st Semester 2022-2023 2-11-2022 Max Time: 90 minutes Max Marks: 60

Part-A (30 Marks)

Name:

ID No:

Q1) Fill in the blanks (10 x 1 =10 marks)

a) In Fehling's test the red precipitate formed is due to the formation of _____.

b) _____does not reduce Fehling's reagent, it has to be hydrolyzed, after which it gives positive Fehling's test.

c) Methyl salicylate has the smell of_____.

d) In DNP test the colour of hydrazone precipitate formed is often a guide to the amount of _____ in the original aldehyde or ketone.

e) The Jones oxidation converts primary alcohols to_____.

f) In Diel's–Alder reaction, the reaction is stereospecific with respect to both diene and _____.

g) _____ rearrangement is used in organic synthesis to reduce the length of carbon chain by one carbon atom.

h) Caprolactam is feedstock in manufacture of Nylon-6, it is produced by _____rearrangement.

i) Cyanide and isocyanide are _____isomers.

j) Aldehydes which do not have α-hydrogen undergo _____reaction in presence of strong base to give salt of the acid and corresponding primary alcohol.

Q2) Choose the correct option (Put Tick mark) (5x 1 =5 marks)

a) Medication used to reduce fever are known as

(i) antipyretic (ii) analgesic (iii) simethicone (iv) antihistamines

b) Salicylic acid is

(i) a sweetner (ii) an anti-depressant (iii) a keratolytic agent (iv) an inflammatory agent

c) Which of the following are used as a starting material for the manufacture of azo dyes

(i) Aldehydes (ii) Primary aromatic amines (iii) Primary alcohols (iv) Secondary alcohols

d) Polyols are

(i) salt replacers in food industries (ii) sugar replacers in food industries

(iii) catalyst promoters in polymer industries (iv) catalyst inhibitors in polymer industries

e) Pyrene is trade name of _____when used as fire extinguisher.

(i) CH_3Cl (ii)CH_2Cl_2 (iii) $CHCl_3$ (iv) CCl_4

Q3a) Read the statements carefully and write Yes or No (3 marks)

(i) An optically inactive substance can be either an achiral substance or a racemic mixture.

(ii) 1,1-dichloroethene can exist as *cis* and *trans* geometric isomer.

(iii) cis and trans geometric isomers are easily interconverted.

Q3b) A student was given a sample. What would be the observed rotation if a solution of the sample was made by dissolving 0.250 g in 2.0 mL of acetontirile and was then placed in a 0.5 dm cell? A pure sample of the (+) enantiomer of the compound shows $[\alpha] = 42^{o}$. (please write formula and show calculations in supplementary sheet provided).
Ans:

(4 marks)

Q4) An organic compound **A** ($C_6H_{12}O$) forms an oxime but does not reduce Tollens reagent. **A** on reduction with sodium-amalgam forms an alcohol **B** which on dehydration forms chiefly a single alkene **C**. The ozonolysis of **C** (with Zn) produces **D** and **E**. The compound **D** reduces Tollens reagent but does not give iodoform test. The compound **E** does not reduce Tollens reagent but gives iodoform test. **(2+2+2+1+1 = 8 marks)**
What are the structures of the above compounds **A, B, C, D and E**?
(Please use supplementary sheet to do rough work)

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Part-B (30 Marks)

Instructions:

- All parts of a question must be answered at a single place.
- Please do not provide any explanations.

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1. (a) Discuss on the ion selective electrode (ISE) with a schematic **(4 marks)**

   (b) Calculate the specific conductance and molar conductance of **0.0682 M NaOH**, if the resistance offered and cell constant are **80.5 Ω** and **98.7 m^{-1}** respectively.
   (3 marks)

2. Calculate the EMF of the following Zn-Ag cell at **25.6 °C** if the concentration of $ZnSO_4$ and $AgNO_3$ are **0.195 M** and **0.0282 M** , respectively. Given that $E^o_{Zn2+/Zn}$ = **-0.78 V** and $E^o_{Ag+/Ag}$ = **+0.8 V**
   (7 marks)

3. (a) Discuss atleast five important characteristics of a battery. **(5 marks)**

   (b) A lead acid battery needs to be recharged by reversing the discharge reaction. Explain the same with accurate chemical reactions. **(6 marks)**

4. Discuss on the breakthrough concentration profile in the fluid at outlet of bed with a diagram **(5 marks)**