

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [BATCH 2016-19]

B.A./B.Sc. SECOND SEMESTER (January – June) 2017

Mid-Semester Examination, March 2017

INDUSTRIAL CHEMISTRY (Honours)

Date : 15/03/2017

Time : 11 am– 1 pm

Paper : II

Full Marks : 50

[Use a separate Answer Book for each group]

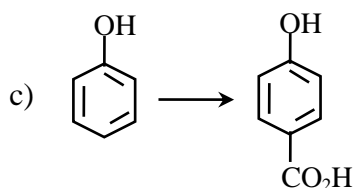
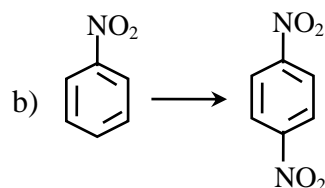
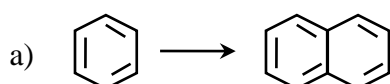
Group – A

(Answer any four questions)

[4×5]

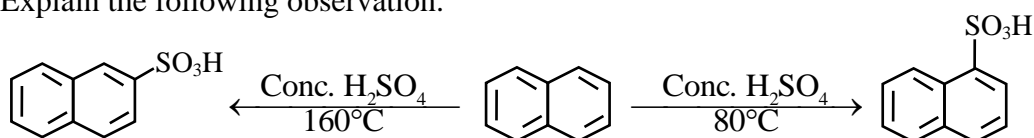
1. Complete the following conversions.

[2+2+1]



2. a) Explain the following observation.

[3]

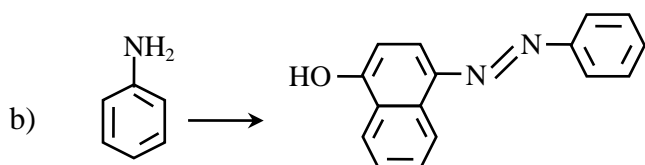
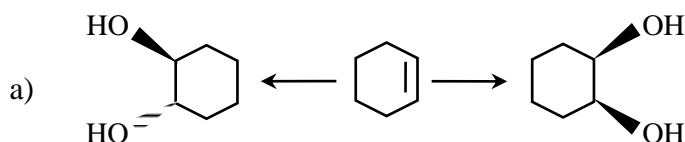


b) Between cis- and trans-2-butene which one undergoes hydrogenation in faster rate any why?

[2]

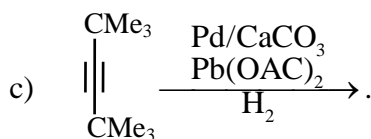
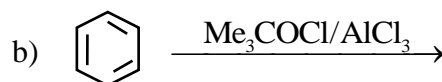
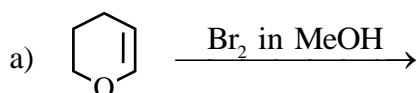
3. Carry out the following conversions with detailed mechanism.

[2×2·5]



4. Predict the product of the following reactions with stereochemistry (if necessary).

[2+1·5+1·5]



5. a) Write the role of Cu(I) ion in Gattermann-Koch reaction?

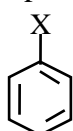
[1·5]

b) What is the difference between aromatic and aliphatic bimolecular substitution reaction?

[1·5]

c) Explain the relative rate of nucleophilic substitution of the followings halobenzenes.

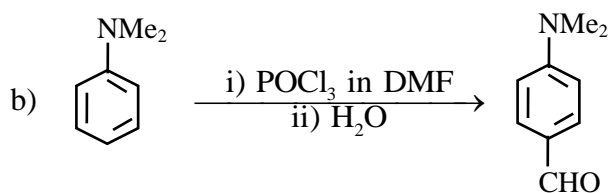
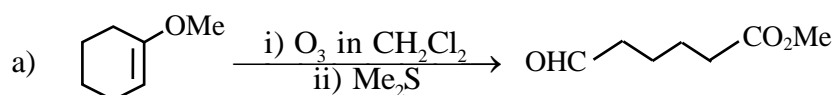
[2]



X = F, Cl, Br, I

6. Provide the detailed mechanism for the following transformations.

[2×2.5]



Group – B

(Answer any three questions)

[3×5]

7. State Kohlrausch law of independent migration. What is the effect of dilution on equivalent conductance of strong and weak electrolyte? [2+3]
8. Define ionic mobility with its unit. Explain transport number of ions with mathematical expression. Compare the conductance of alkali metal ions in aqueous solution. [2+1.5+1.5]
9. a) What do you mean by “molecularity of a reaction”? [1]
 b) “The order of a non-aqueous decomposition of sucrose is one” true or false? [1]
 c) In a particular experiment it was found that the concentration of N_2O_5 in liquid bromine varied with time as follows :

Time (sec)	0	200	400	600	1000
$[N_2O_5]$ mol/lit	0.11	0.073	0.048	0.032	0.014

Confirm that reaction is first order and determine the rate constant.

[3]

10. a) “Reaction of order less than one always goes to completion”—Justify. [1]
 b) Plot a graph of concentration vs $t_{1/2}$. [1]
 c) A first order reaction is 20% complete in 10 min at 25°C and 40% complete in 12 min at 40°C. Calculate the E_a . [3]
11. a) From Vant's Hoff equation, derive the following equation $\ln \frac{K}{A} = -\frac{E_a}{RT}$. [3]
 b) The rate of the reaction is given by : $\log K = A - \frac{B}{T} + C \log T$. Find out the value of activation energy. [2]

Group – C

(Answer any three questions)

[3×5]

12. What do you mean by levelling effect of a solvent? Explain the acidity order of H_3PO_2 , H_3PO_3 and H_3PO_4 . Give one example of Super acid. [1+3+1]
13. What are “Lewis acids” and “Lewis bases”? Give examples of each. Arrange and explain according to Lewis acid character : BF_3 , BCl_3 , BBR_3 and BI_3 . [2+3]
14. “Ionisation constant and Ionic product of water are not the same”—Explain. Define Buffer Capacity. “Any indicator may be used in the titration of strong acid by a strong base”—Explain. [2+1+2]
15. a) State the difference between imperfect and perfect complexes. [2]
 b) Define, with an example of each, (i) chelating ligand and (ii) flexidentate ligand. [3]

16. When $\text{K}_2[\text{Pd}(\text{SCN})_4]$ is treated with bipyridil (bpy) at -78°C gives an orange yellow product (A), which is converted to light yellow compound (B) when (A) is heated at 150°C . The (B) can be prepared if $\text{K}_2[\text{Pd}(\text{SCN})_4]$ is allowed to react with bpy at 25°C .

Write down the formulas of (A) and (B) mentioning their relation, if any. Which one is more stable product at normal condition and why? [2+1+1+1]

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