

Total No. of printed pages = 10

3(Sem 2) CHM M2

2015

CHEMISTRY

(Major)

Paper : 2.2

Full Marks – 60

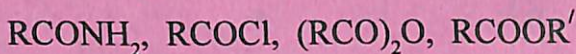
Time – 2½ hours

The figures in the margin indicate full marks for the questions.

1. (a) What do you mean by syn-clinal and anti-clinal conformations ? 1×7=7
- (b) Draw the most stable conformer of 1, 2-difluoroethane.
- (c) How will you prepare Gilman's Reagent for the synthesis of alkane ?
- (d) Arrange the stabilities of conjugated diene, isolated diene and cumulated diene in decreasing order.

[Turn over

- (e) Arrange the following derivative of carboxylic acid in order of reactivity with nucleophiles.
(increasing order)

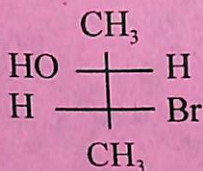


- (f) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NH}_2$ boils at 49°C whereas $(\text{CH}_3)_3\text{N}$ boils at 3°C . Explain.

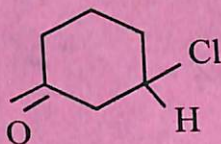
- (g) Nitroalkanes and nitroarenes are good solvents for polar compounds. Explain.

2. Answer any *four* questions : $2 \times 4 = 8$

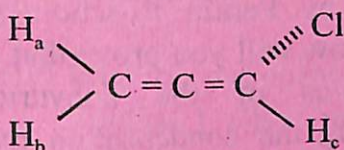
- (a) Draw the corresponding Newman and Saw horse projection of the following molecule.



- (b) Assign R or S designation with IUPAC nomenclature of the following molecule.



- (c) Draw the different conformations of cyclohexane and also draw the potential energy curve for the different conformers.
- (d) Identify the faces present in E and Z, but-2-ene with a suitable reaction.
- (e) What do you mean by Re and Si-face ? Give an example.
- (f) Find the topicity of the hydrogens in



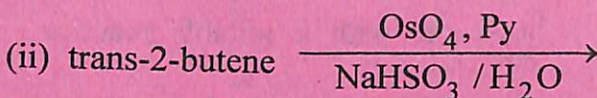
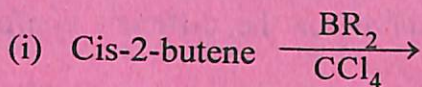
3. Answer any *three* questions : 5×3=15

- (a) What is ortho-effect ? Explain on this basis why nearly all ortho substituted benzoic acids are stronger acid than benzoic acid. 2+3=5
- (b) What is ipso attack ? Explain with an example. Write the product of the following reaction 2+2+1=5



- (c) Write the products in each case and give mechanism.

$$1\frac{1}{2} + 1\frac{1}{2} + 2 = 5$$

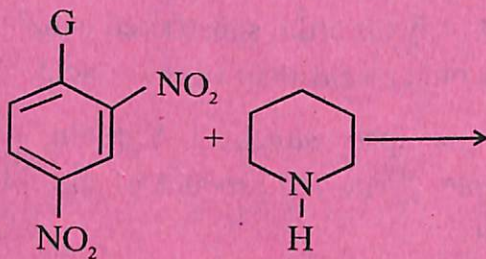


- (d) How will you prepare cinnamic acid from benzaldehyde by Perkin Reaction ? Write mechanism. How will you prove that only α hydrogen atoms of the anhydride are involved during the condensation reaction.

$$1 + 3 + 1 = 5$$

- (e) In the following reaction find the products.

$$1 + 4 = 5$$



The rate of the reaction does not change appreciably with change in the nature of G, except when G = Fluorine. Explain.

4. Answer any *three* questions :

10×3=30

(a) (i) What happens when an allene $\text{CH}_2 = \text{C} = \text{CH}_2$ is treated with dil. H_2SO_4 ? Give reaction. 2

(ii) Cyclopentadiene has an active hydrogen. To show this give a reaction. 2

(iii) How will you prepare an alkane by Hunsdiecker reaction ? Give probable mechanism. 3

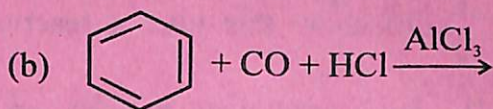
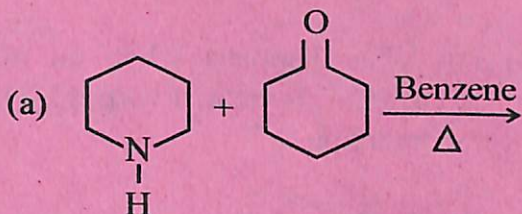
(iv) What do you mean by transesterification reaction ? Give one example. 1+1=2

(v) Carbonic acid ($\text{pK}_a=6$) is stronger acid than phenol ($\text{pK}_a=9.95$). Explain. 1

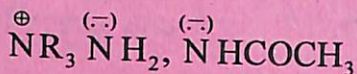
(b) (i) In Rosenmund reduction of RCOCl to RCHO the catalyst Pd/BaSO_4 , H_2 is used along with small amount of sulphur or quinoline. Explain. 2

(ii) What happens when propionaldehyde is treated with Al(OEt)_3 ? What is the name of the reaction ? 2

(iii) Complete the following reactions : 2



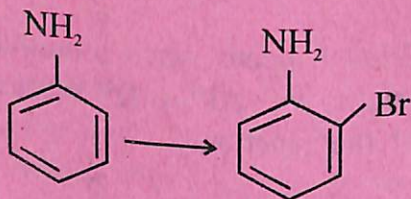
(iv) Arrange the following group in increasing activating order towards electrophilic reagent with explanation. 3



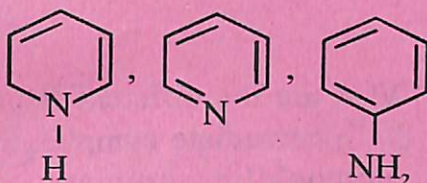
(v) Formaldehyde undergoes Cannizzaro reaction, but acetaldehyde does not. Explain. 1

(c) (i) How will you protect a $-\text{NH}_2$ group in aniline during nitration ? 1

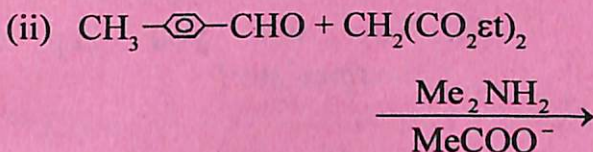
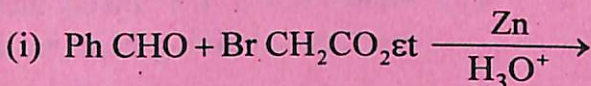
(ii) Convert the following : 2



- (iii) Arrange the following in increasing order of basicity : 1



- (iv) Write the products with mechanism and name the following reactions : $2 \times 3 = 6$



- (d) (i) What do you mean by Kinetic Isotope effect ? How this effect can be applied as evidence for Areniumion mechanism in ArSE_2 reaction ? $1\frac{1}{2} + 1\frac{1}{2} = 3$

- (ii) Benzene does not decolorise bromine water. Explain. 2

- (iii) Friedel Crafts acylation of aniline is difficult. Briefly explain. 2

(iv) How will you explain that electrophilic substitution in anthracene takes place almost exclusively at 9 or 10 position.

3

(e) (i) What are the different steps involved in the intermediate complex mechanism of nucleophilic aromatic substitution reaction? What are the evidences in support of this mechanism ? 2+2=4

(ii) Write down the mechanism of ArSN reaction involving benzyne intermediate.

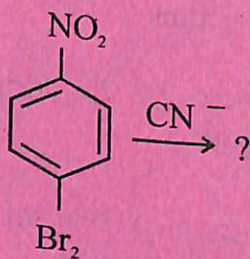
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(iii) How will you trap a benzyne intermediate?

2

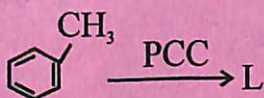
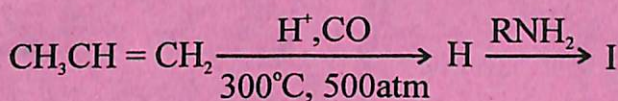
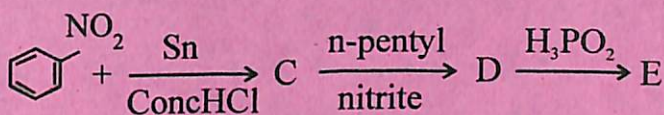
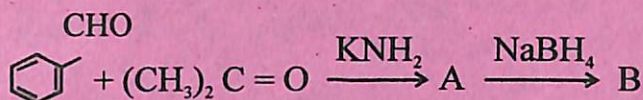
(iv) Write the product of the following reaction :

1



(f) Identify the products in the following reactions : 6

(i)



(ii) Benzene is not used as a solvent for the Friedel Crafts alkylation of chlorobenzene. Explain. 2

(iii) Between phenol and benzylalcohol which one is stronger acid ? Give reason. 2