

Total No. of printed pages = 10

3(Sem 2) CHM M2

2015

**CHEMISTRY**

**(Major)**

Paper : 2.2

Full Marks – 60

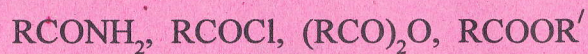
Time – 2½ hours

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.

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

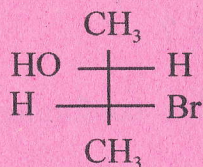


- (f)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NH}_2$  boils at  $49^\circ\text{C}$  whereas  $(\text{CH}_3)_3\text{N}$  boils at  $3^\circ\text{C}$ . Explain.

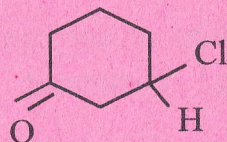
- (g) Nitroalkanes and nitroarenes are good solvents for polar compounds. Explain.

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.



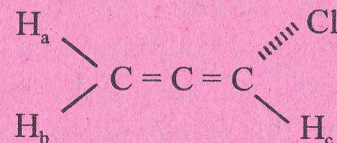
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- (c) Draw the different conformations of cyclohexane and also draw the potential energy curve for the different conformers.

- (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.

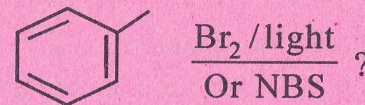
- (f) Find the topicity of the hydrogens in



3. Answer any *three* questions :  $5 \times 3 = 15$

- (a) What is ortho-effect ? Explain on this basis why nearly all ortho substituted benzoic acids are stronger acid than benzoic acid.  $2+3=5$

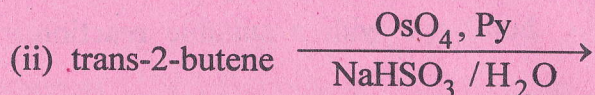
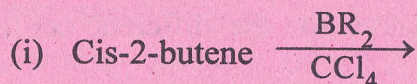
- (b) What is ipso attack ? Explain with an example. Write the product of the following reaction  $2+2+1=5$



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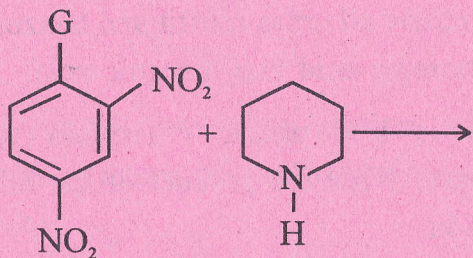
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(c) Write the products in each case and give mechanism.  $1\frac{1}{2}+1\frac{1}{2}+2=5$



(d) How will you prepare cinnamic acid from benzaldehyde by Perkin Reaction ? Write mechanism. How will you prove that only  $\alpha$  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 :  $10 \times 3 = 30$

(a) (i) What happens when an allene  $\text{CH}_2 = \text{C} = \text{CH}_2$  is treated with dil.  $\text{H}_2\text{SO}_4$  ? 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

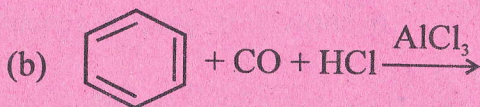
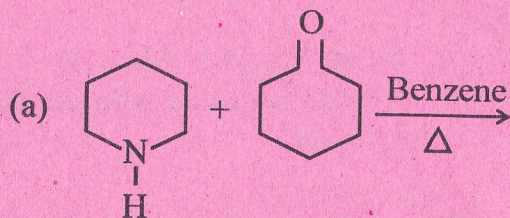
(iv) What do you mean by transesterification reaction ? Give one example.  $1+1=2$

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

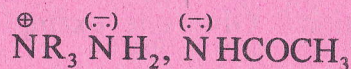
(b) (i) In Rosenmund reduction of  $\text{RCOCl}$  to  $\text{RCHO}$  the catalyst  $\text{Pd}/\text{BaSO}_4$ ,  $\text{H}_2$  is used along with small amount of sulphur or quinoline. Explain. 2

(ii) What happens when propionaldehyde is treated with  $\text{Al}(\text{OEt})_3$  ? What is the name of the reaction ? 2

(iii) Complete the following reactions : 2



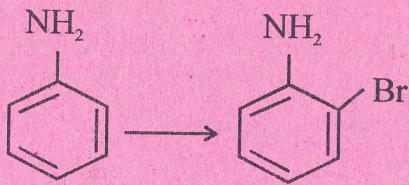
(iv) Arrange the following group in increasing activating order towards electrophilic reagent with explanation. 3



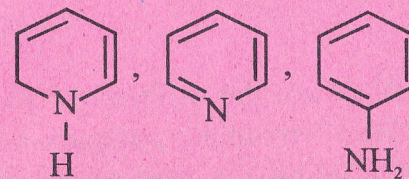
(v) Formaldehyde undergoes Cannizzaro reaction, but acetaldehyde does not. Explain. 1

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

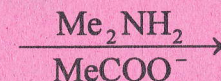
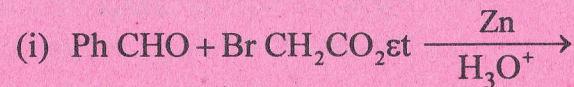
(ii) Convert the following : 2



(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  $\text{ArSE}_2$  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.

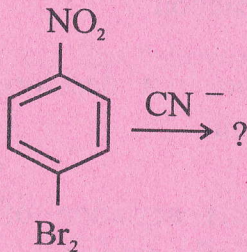
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(iii) How will you trap a benzyne intermediate?

2

(iv) Write the product of the following reaction:

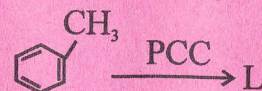
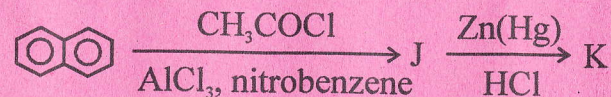
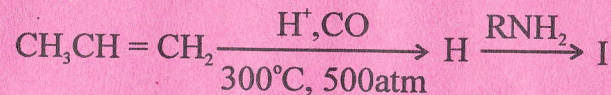
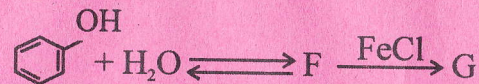
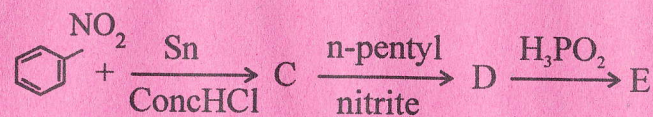
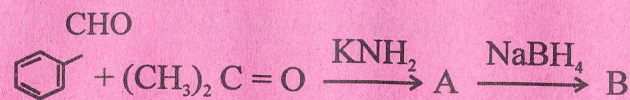
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(f) Identify the products in the following reactions:

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