

1.

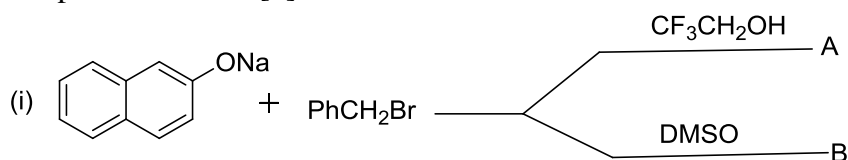
(A) Explain- All Chiral Centre's are Stereogenic centres but all Stereogenic centres are not Chiral centres. [1.5]

(B) Heat of combustion and not heat of hydrogenation is more suitable to compare the stabilities of 1-butene, cis-2-butene, trans-2-butene and isobutene - Explain. [3]

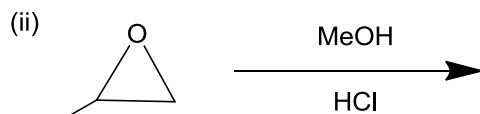
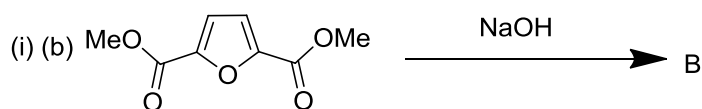
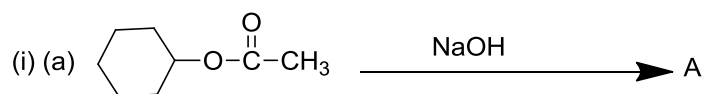
(C) Write down the structure of a Chiral molecule having a  $C_2$  - axis. [0.5]

2.

(A) Predict the products- [3]



Or,



(B) Salicylic acid is much stronger than p-hydroxy benzoic acid but acidity of o-nitrophenol and p-nitrophenol is almost same - Explain. [2]

3.

(A) The enol content of acetylacetone at equilibrium is very large (92%) in hexane medium, in acetonitrile (58%) medium, and small (15%) in water. Offer an Explanation. [3]

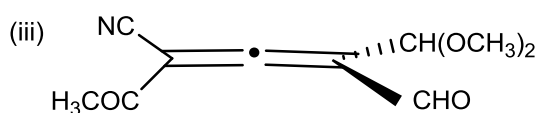
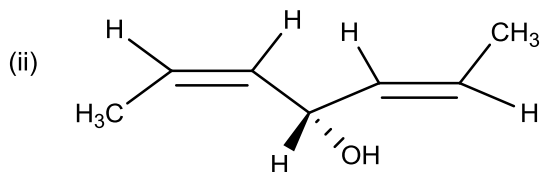
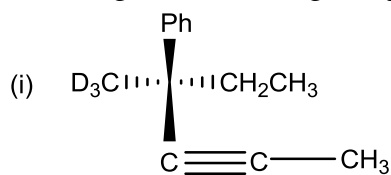
(B) Draw the following as indicated - [2]

(i) (Z,E) isomer of Benzildioxime.

(ii) Anti-conformer of PhCH(OH)CH(CH\_3)COCH\_3 .

4.

(A) Assign the following compounds with R/S Descriptor. [3]



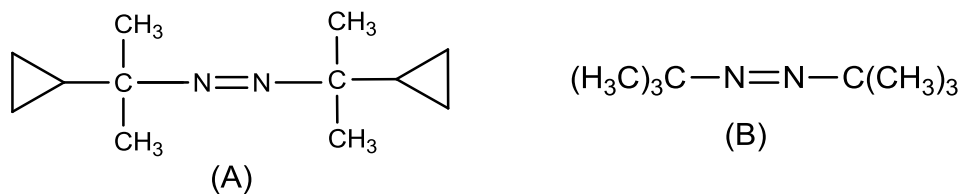
(5)

(A) Draw all the  $\pi$ -molecular orbitals of allyl cation, allyl anion and allyl radical. Arrange them in order of increasing energy levels. Identify the HOMO and LUMO in each case. [3]

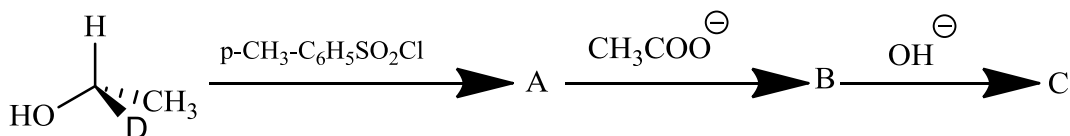
(B) Compare the base strengths of Ethylamine, Guanidine and Ethanamide and Explain. [2]

(6)

(A) The azo compound (A) decomposes 20 times faster than the compound (B). Suggest the reason for this observation. [2]

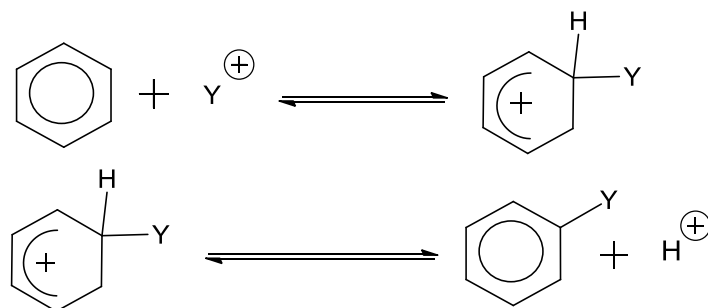


(B) Account for the stereochemical course involved in each step of the following reaction sequence and give the three dimensional structures with R/S- designation for A, B and C. [3]



(7)

(A) A two step reaction with  $K_H/K_D = 7$  is given :



Draw and explain the energy profile diagram for the reaction showing the transition state(s) and intermediate. Indicate the rate determining as well. [3]

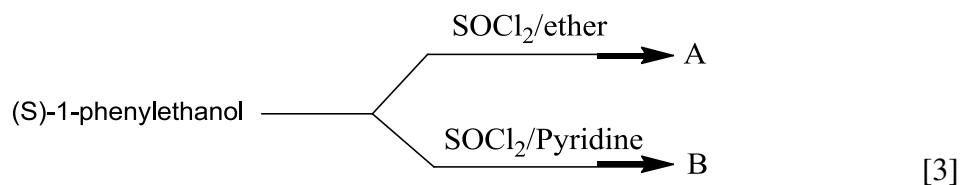
(B) Which one of the following has higher dipole moment and why? [2]

Vinyl Chloride and Vinyl fluoride

(8)

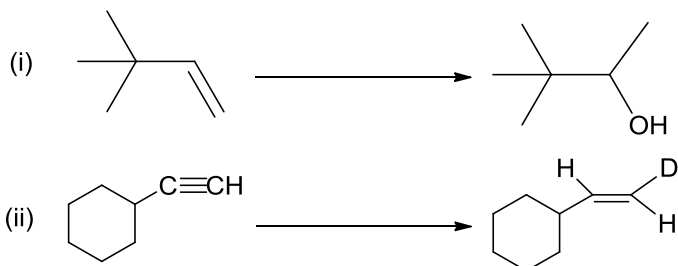
(A) What are the necessary conditions to show optical activity of a compound? What will be the Optical Purity of a Chiral substrate if it contains the two enantiomers in the ratio of 3:1. [2]

(B) Explain the following reactions with plausible mechanism and give the structure of A and B.

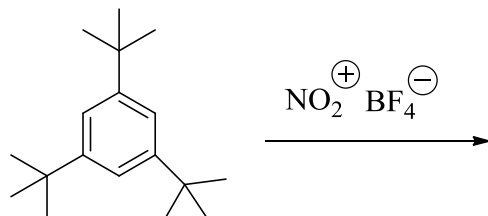


(9)

(A) Transform: [3]



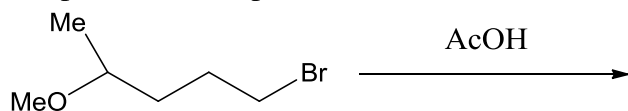
(B) Write down the course of the reaction giving appropriate mechanism : [2]



(10)

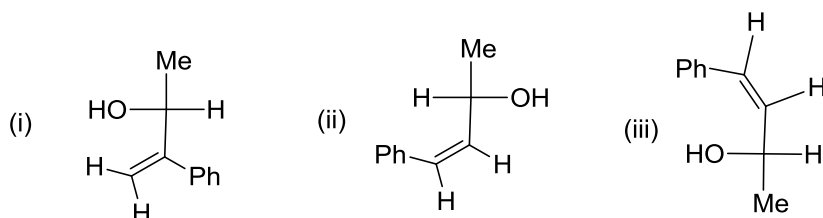
(A) Draw the orbital pictures of singlet and triplet Carbene . Comment on their bond angle. [3]

(B) Predict the product and explain : [2]



(11)

(A) Label the following as Homomer, enantiomer or diastereomer. [3]



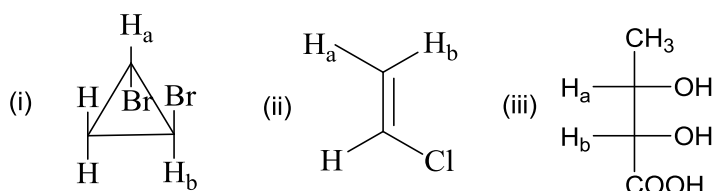
(B) Predict configuration of products when-

[2]

- (i) Pro-R- hydrogen of propanol is replaced by Br.
- (ii)  $\text{CN}^-$  is attacked from the  $R_e$  face of Propanol.

(12)

(A) Identify  $H_a$  and  $H_b$  in each of the following structures as Homotopic, Enantiotopic or Diastereotopic ligands. [3]



(B) Comment on the Optical activity of  $\text{MeN(Ph)CH}_2\text{Me}$  and its corresponding N-oxide. [2]

[Note: IIT-JEE & Medical aspirants, whoever love Organic Chemistry can also try to solve the question .]

\*\*\*\*\*All The Best\*\*\*\*\*Do Well\*\*\*\*\*