SH-I/Chemistry-101C-1(T)/19

B.Sc. Semester I (Honours) Examination, 2018-19

CHEMISTRY

Course ID : 11411 **Course Code : SHCHE/101/C-1(T)**

Course Title: Organic Chemistry-I

Time: 1 Hour 15 Minutes **Full Marks: 25**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five* questions: 1×5=5

(a) Why Carbon-Carbon bond length in tetrafluoroethylene is less than that in ethylene?

(b) Which is the smallest aromatic substance?

(c) Draw Frost diagram for benzene.

(d) What is the basic difference between epimer and enantiomer?

(e) Which of the following species behave both as nucleophile(s) and electrophile(s)?

$CH_3—C\equiv N:$, CH_3O^-, $H_2C=\ddot{O}:$, $:CCl_2$, $\overset{+}{N}O$

(f) Which carbocation is more stable and why?

$Me—\overset{\oplus}{C}H—OMe$ or $Me—\overset{\oplus}{C}H—SMe$

(g) Draw the structure of (E)–oxime of acetophenone.

(h) Draw the threo–form of 3-bromo-2-butanol in Fischer Projection formula.

2. Answer *any two* of the following: 5×2=10

(a) (i) What is Molecular rotation? Mention the factors affecting specific rotation of organic compounds.

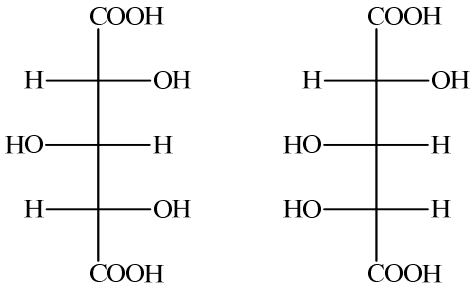
(ii) A sample of 2-methyl-1-butanol has a sp. rotation, $[\alpha]_D^{25} = +1{\cdot}5°$. What is the % enantiomeric excess of the sample? What enantiomer is in excess, the R(+)/S(–)?

[For (R)–(+)-2-methyl-1-butanol, $[\alpha]_D^{25} = +5 \cdot 76°$]

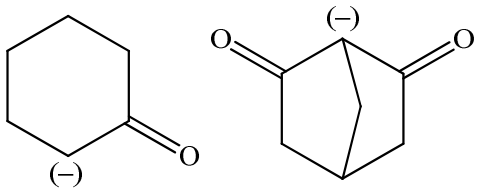
(iii) Draw the M.O. picture of LUMO for 1,3-butadiene. 2+2+1=5

(b) (i) Why the m.pt. of sulphanilic acid is so high?

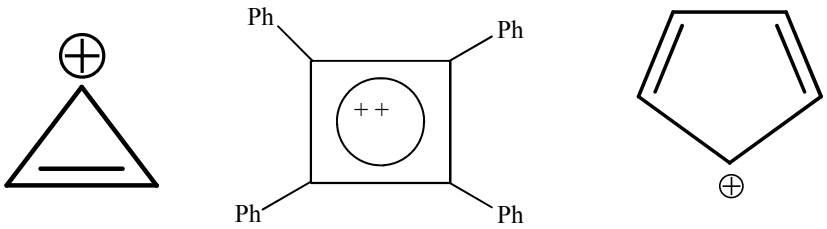
(ii) Label the C-3 centres of the following molecules as stereogenic, non-stereogenic and chirotopic/achirotopic. Justify your answer.



(iii) What is the state of hybridization in each of the following carbanions? 2+2+1=5

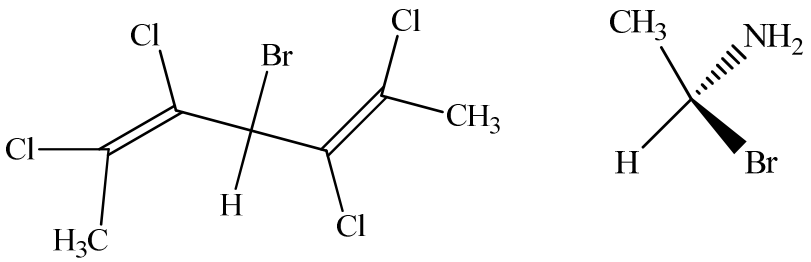


(c) (i) Classify the following molecule/ion into aromatic, non-aromatic and anti-aromatic. Give reason.



(I) (II) (III)

(ii) Designate R/S descriptors in the following molecules.



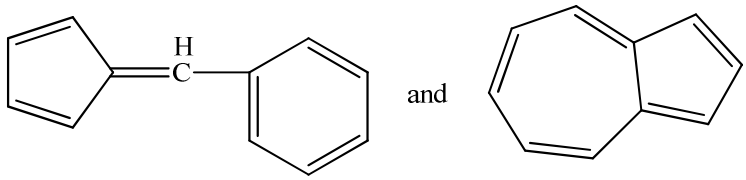
(I) (II)

3+2=5

(d) (i) Define with example(s): Radical reaction and pericyclic reaction

(ii) Calculate the formal charge on oxygen atom in methoxide ion.

(iii) Compare the dipole moment of the following compounds:



2+1+2=5

3. Answer *any one* of the following questions: 10×1=10

(a) Give the product(s) of the following reactions:

(i) $CH_2N_2 \xrightarrow{\triangle} ?$

$H_3C - CHCl_2 \xrightarrow{C_6H_5Na} ?$

Give the structure(s) and comment on the stabilities of the product formed in the above reactions.

(ii) Depict the symmetry elements present in NH_3 molecule and indicate its point group.

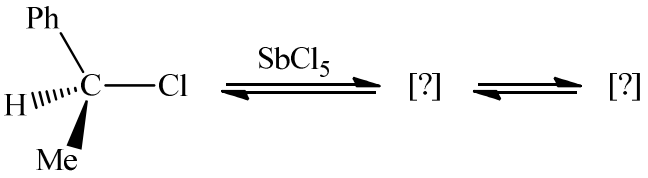
(iii) Draw the structures of

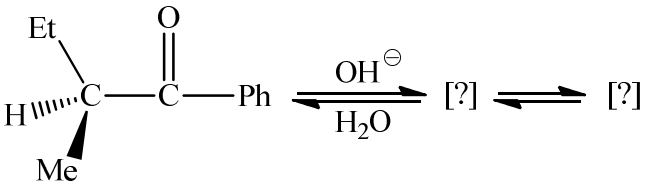
$\overset{+}{C}H_3$ and $\overset{+}{C}H_5$

(iv) Compare the b. pt. of isomeric pentones with reason.

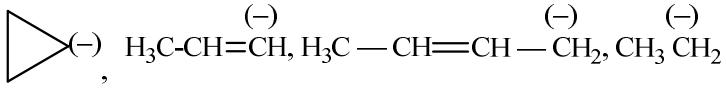
(v) What are the structural features required for the generation of carbanions? Explain with example. 3+2+1+2+2=10

(b) (i) Give the intermediate(s) and product(s) of the following reactions, and comment on the optical properties of the product(s).

(p) 

(q) 

(ii) Rank the following carbanion in order of decreasing stability and explain the order.



(iii) Discuss the principle of resolution of a racemic mixture of 2-ethyl hexanoic acid.

(iv) Give example of an organic molecule having only C_2 element of symmetry.

(v) In the following reaction identity the substrate, nucleophile and leaving group. Mention the type of reaction.

$CH_3 I + CH_3 CH_2 ONa \longrightarrow CH_3 OCH_2 CH_3 + NaI$

3+2+2+1+2=10

———————