LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

SECOND SEMESTER – **APRIL 2023**

UCH 2501 – CHEMISTRY OF HYDROCARBONS

Date: 29-04-2023 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

	SECTION A - K1 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
1.	**True or False**	
a)	The anionic species containing trivalent carbon with a lone pair of electrons is called carbonium ion.	
b)	Methane can be prepared by Wurtz reaction.	
c)	Addition of bromine to an alkene is used to detect the presence of unsaturation in a compound.	
d)	Acetylene is strongly acidic than ammonia.	
e)	Halogenation of aromatic compounds involves the formation of π-complex.	
2.	**Choose the correct answer**	
a)	The decreasing order of stability of free radicals is (A) allyl > benzyl > *tert*. alkyl > *prim* alkyl (B) benzyl > *tert* alkyl > *prim* alkyl > allyl (C) benzyl > allyl > *tert* alkyl > *prim* alkyl (D) *tert* alkyl > allyl > benzyl > *prim* alkyl	
b)	The decreasing order of halogenation of alkanes will be (A) fluorination > chlorination > bromination (B) chlorination > bromination > fluorination (C) bromination > fluorination > chlorination (D) fluorination > bromination > chlorination	
c)	Conjugated dienes are more stable than isolated dienes due to_____ (A) less contributing structures (B) more contributing structures (C) resonance stabilization (D) none of these	
d)	1-pentyne when heated with alcoholic KOH gives the major product_____ (A) 1,2-pentadiene (B) 2-pentyne (C) 1,3-pentadiene (D) 2-pentanone	
e)	Cyclopropenyl cation is (A) Benzenoid aromatic (B) anti-aromatic (C) Aromatic sextet theory (D) non-benzenoid aromatic	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**Match the following**	
a)	Gilman reagent ---- Lewisite	
b)	Wurtz reaction ---- Detection of double bond	
c)	Insecticide ---- Even number of carbon atoms	
d)	Bayer's test ---- R_2CuLi	
e)	War gas ---- Napthalene	
4.	**Define the following**	
a)	Delocalisation energy	
b)	Alicyclic hydrocarbons	
c)	Radical Inhibitors	

d)	Tautomerism
e)	Dewar Benzene

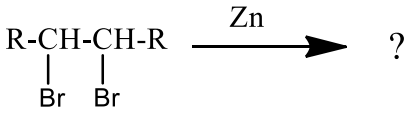
SECTION B - K3 (CO2)

Answer any TWO of the following in 100 words **(2 x 10 = 20)**

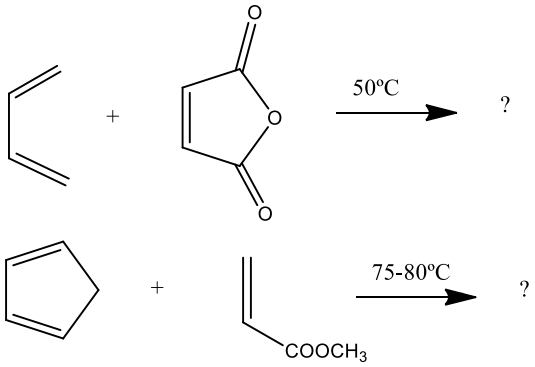
5. (a) Indicate the major differences between electromeric and inductive effects.
(b) Identify the increasing order of stability of the following carbanions:
Benzyl carbanion, diphenylmethyl carbanion, triphenylmethyl carbanion, phenyl carbanion.
(c) Benzoic acid is a weaker acid than p-nitrobenzoic acid. Justify. (5+3+2 marks)

6. Write the mechanism for the Corey-House synthesis of alkanes and Dieckmann condensation reaction.

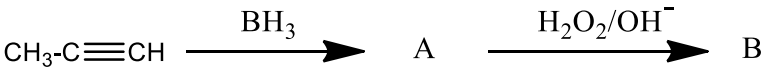
7. (a) Predict the mechanism for the following reactions. 5 marks



(b) Write the products for the following reactions: 5 marks



8. (a) Write the Kekule's structure of benzene. Mention the limitations of the Kekule's structure.
(b) Idenify the compound A and B in following sets of reactions:



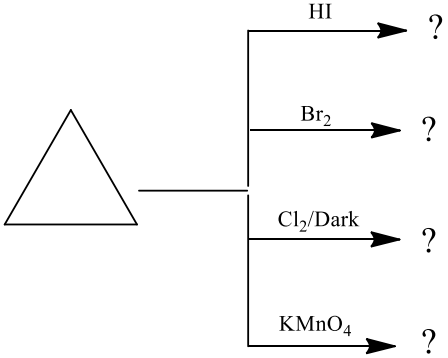
5 + 5 marks

SECTION C – K4 (CO3)

Answer any TWO of the following in 100 words **(2 x 10 = 20)**

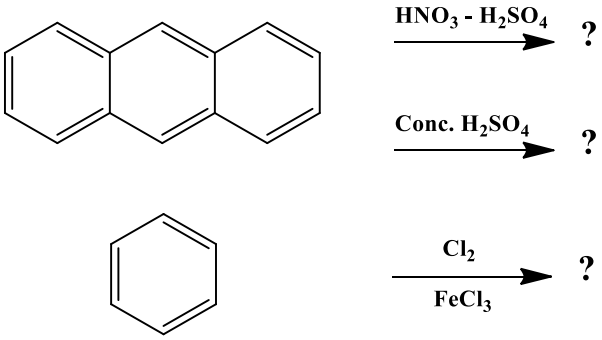
9. (a) Compare the structure of singlet and triplet carbene. 5 marks
(b) Write the products of ozonolysis of acetylene and write its mechanism. 5 marks

10. Write the possible products for the following reactions and explain:



11. (a) Explain the major differences between Saytzeff and Hofmann rule with suitable examples.
(b) How will you show that 1,4-addition is favoured over 1,2-addition at high temperature in reaction of HBr to 1,3-butadiene? 5+5 marks

12. Predict the major product and mechanism for the following reactions. 10 marks



SECTION D – K5 (CO4)

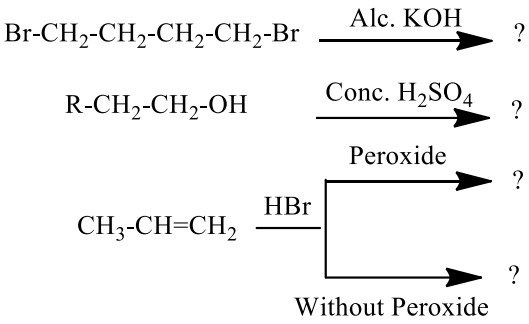
Answer any ONE of the following in 250 words **(1 x 20 = 20)**

13. (a) What are carbanions? How are they generated? Arrange the following in the order of increasing stability: $CH{\equiv}C^-$, $CH_3CH_2^-$, $CH_2{=}CH^-$ 8 marks

(b) State the postulates of Sachse-More strainless theory. 7 marks

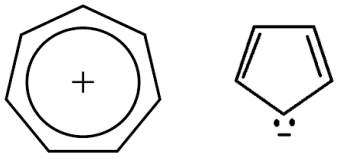
(c) Explain why alkynes undergo nucleophilic addition reactions whereas alkenes fail to undergo nucleophilic addition. 5 marks

14. (a) Predict the products for the following reactions and explain: 10 marks



(b) Nitration of benzene takes place more readily than nitrobenzene. Justify.

(c) State Huckel's rule of aromaticity. Will the following molecules exhibit aromatic character?



4+6 marks

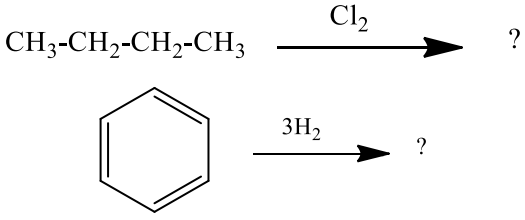
SECTION E – K6 (CO5)

Answer any ONE of the following in 250 words **(1 x 20 = 20)**

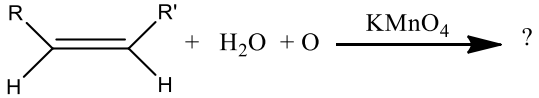
15. (a) Explain amido-iminol tautomerism with an example.

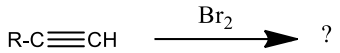
(b) Phenol is a stronger acid than an alcohol. Justify. 5+3 marks

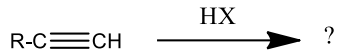
(c) Predict the products for the following reactions and explain the mechanism: 12 marks



16. (a) Write the mechanism for the following reactions:







10 marks

(b) Write the mechanism for the synthesis of phenanthrene from naphthalene using Haworth method. Phenanthrene is more reactive at 9-position towards electrophilic substitution reactions - Explain. 10 marks

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