



CHE-504
M.Sc. 1st SEMESTER EXAMINATION, 2021-22
CHEMISTRY
(Organic Reaction Mechanism)
Credit (4+0)
(CBCS Mode)

Important Instruction :

The question paper is in two sections : Section-A (Descriptive) will be of 15 marks and Section-B (Objective) will be of 60 marks. Section-A will be deposited at the end of the examination and answer sheet (OMR) of Section-B will be deposited.

महत्वपूर्ण निर्देश :

प्रश्न पत्र दो भागों में है : खण्ड-अ (व्याख्यात्मक) 15 अंकों का होगा एवं खण्ड-ब (बहुविकल्पीय) 60 अंकों का होगा। खण्ड-अ परीक्षा के अन्त में जमा कर लिया जायेगा एवं खण्ड-ब का उत्तर पत्रिका (OMR) जमा होगा।

0341

खण्ड-अ (व्याख्यात्मक)
Section-A (Descriptive)

Time : 1 Hrs.

समय : 1 घण्टे

Max. Marks : 15

अधिकतम अंक : 15

अनुक्रमांक (अंकों में) :

Roll No. (In Figures)

अनुक्रमांक (शब्दों में) :

Roll No. (In Words) :

अभ्यर्थी का नाम :

Student Name :

कक्ष परिप्रेक्षक के हस्ताक्षर / Invigilator's Signature :

- Note : (i) Total No. of Questions are Six.
(ii) Answer three questions in all.
(iii) All Questions carry equal marks.
- नोट : (i) कुल छः प्रश्न दिए गये हैं।
(ii) किन्हीं तीन प्रश्नों के उत्तर दीजिए।
(iii) सभी प्रश्नों के अंक समान हैं।

1. Give the various methods in the determination of organic reaction mechanism.
 2. What are ArSN_2 - reaction? Mention conditions for it.
 3. What is sharpless asymmetric epoxidation? Give its mechanism.
 4. Point out cases of neighbouring group participation involving a :
 - (i) Sigma-bond
 - (ii) Phenyl ring
 5. Write short note on any of the following :
 - (i) Cram's rule
 - (ii) Condensation reaction involving Cannizzaro reaction
 6. Discuss addition of halogens to alkenes by taking into account of its :
 - (i) Mechanism
 - (ii) Stereochemistry
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खण्ड—ब (बहुविकल्पीय)
Section-B (Objective)
CHE-504

M.Sc. 1st SEMESTER EXAMINATION, 2021-22
CHEMISTRY
(Organic Reaction Mechanism)

Credit (4+0)
(CBCS Mode)

AFFIX PRESCRIBED
RUBBER STAMP

Date (तिथि) : _____

Paper ID

(To be filled in the
OMR Sheet)

0341

अनुक्रमांक (अंकों में) :

Roll No. (In Figures)

अनुक्रमांक (शब्दों में) : _____

Roll No. (In Words) : _____

Time : 1½ Hrs.

समय : 1½ घण्टे

Max. Marks : 60

अधिकतम अंक : 60

नोट : पुस्तिका में 40 प्रश्न दिये गये हैं, सभी प्रश्न करने होंगे। प्रत्येक प्रश्न 1.5 अंक का होगा।

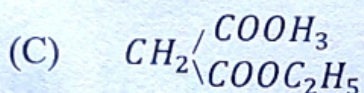
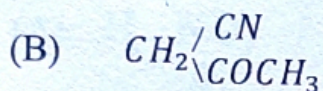
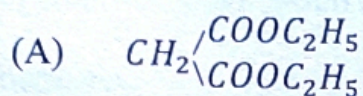
Important Instructions :

1. The candidate will write his/her Roll Number only at the places provided for, i.e. on the cover page and on the OMR answer sheet at the end and nowhere else.
2. Immediately on receipt of the question booklet, the candidate should check up the booklet and ensure that it contains all the pages and that no question is missing. If the candidate finds any discrepancy in the question booklet, he/she should report the invigilator within 10 minutes of the issue of this booklet and a fresh question booklet without any discrepancy be obtained.

महत्वपूर्ण निर्देश :

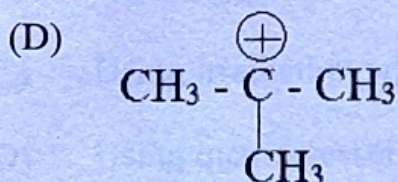
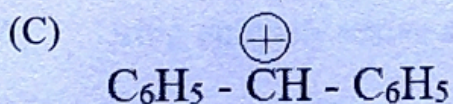
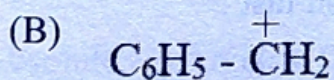
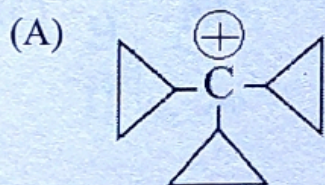
1. अभ्यर्थी अपने अनुक्रमांक केवल उन्हीं स्थानों पर लिखेंगे जो इसके लिए दिये गये हैं, अर्थात् प्रश्न पुस्तिका के मुख्य पृष्ठ तथा साथ दिये गये ओ०एम०आर० उत्तर पत्र पर, तथा अन्यत्र कहीं नहीं लिखेंगे।
2. प्रश्न पुस्तिका मिलते ही अभ्यर्थी को जाँच करके सुनिश्चित कर लेना चाहिए कि इस पुस्तिका में पूरे पृष्ठ हैं और कोई प्रश्न छूटा तो नहीं है। यदि कोई विसंगति है तो प्रश्न पुस्तिका मिलने के 10 मिनट के भीतर ही कक्ष परिप्रेक्षक को सूचित करना चाहिए और बिना त्रुटि की दूसरी प्रश्न पुस्तिका प्राप्त कर लेना चाहिए।

- Reaction intermediate of E_{1cb} reaction is :
 - Carbocation
 - Carbanion
 - Carbene
 - Free radical
- Which of the following compounds will give Knoevenagel reaction with aromatic aldehydes?



(D) All of these

- Which among the following Carbocations is most stable :



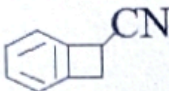
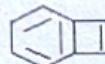
4. Which one of the following species is a nucleophile :

- (A) NF_3
- (B) PCl_3
- (C) NH_2OH
- (D) OF_2

5. Which one of the following statements is not correct for electrophile :

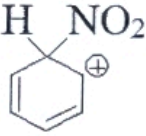
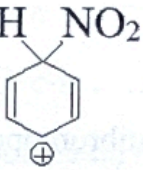
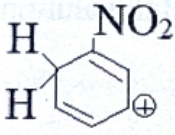
- (A) Electron deficient species are electrophile
- (B) Electrophiles are Lewis acids
- (C) All +ive charged species are electrophile
- (D) $AcCl_3$, SF_6 , IF_7 and SO_3 are electrophiles

6.  + $CH_2 = CHCN \rightarrow$ Product Product is :

- (A) 
- (B) 
- (C) 
- (D) 

7. Which one of the following compounds undergoes nitration fast :

- (A) 
- (B) 
- (C) 
- (D) 

8. Cannizzaro reaction is example of :
- (A) Redox reaction
 - (B) Disproportionation
 - (C) Both (A) and (B)
 - (D) Only oxidation
9. Which of the following resonance structure is not a contributor to the cyclohexadienyl cation (Carbocation σ - complex) intermediate in the nitration of benzene.
- (A) 
 - (B) 
 - (C) 
 - (D) None of the above (all are contributors)
10. Absolute asymmetric synthesis can be carried out by :
- (A) Using optically active solvent
 - (B) Reacting an optically active reactant with a non-optically active one
 - (C) Using irradiation with circularly polarised light
 - (D) Using quartz vessel as the reaction container

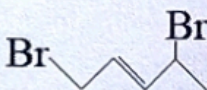
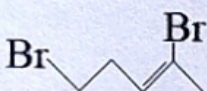
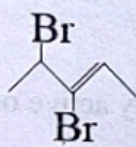
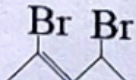
11. The reactive intermediate in a typical Simmons-Smith reaction is a :

- (A) Carbocation
- (B) Carbanion
- (C) Free radical
- (D) Carbene

12. Which alkene gives a meso compound upon reaction with Br_2 in CH_2Cl_2 ?

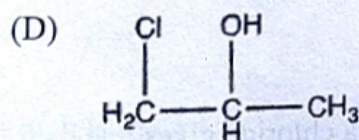
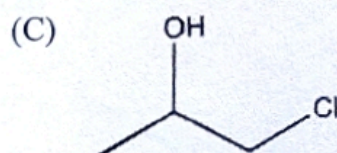
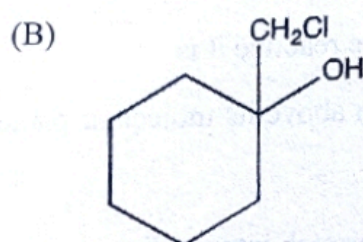
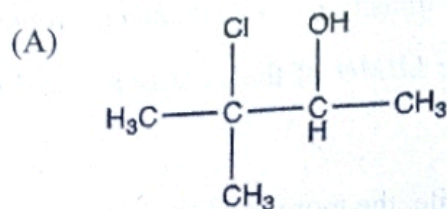
- (A) 
- (B) 
- (C) 
- (D) 

13. Which is the main final product when the initial product [4,5-dibromopent-2-ene] from the 1,2-addition of bromine to penta-1,3-diene is heated in solution?

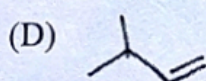
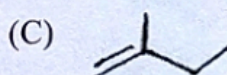
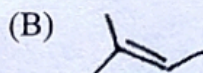
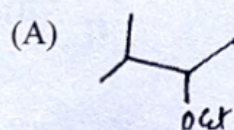
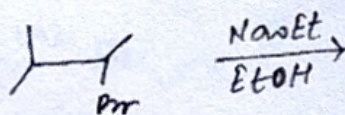
- (A) 
- (B) 
- (C) 
- (D) 

14. Which of the following statements is wrong?
- (A) The main orbital interactions in the transition state of an electrophilic addition to an alkene are between the *LUMO* of the electrophile and the *HOMO* of the alkene
 - (B) The lower the *LUMO* of the electrophile, the more reactive it is
 - (C) The lower the *HOMO* of the alkene, the more reactive it is
 - (D) The electrophile approaches the alkene from above its molecular plane in addition reactions
15. Addition reaction of bromine to alkenes proceeds through intermediate :
- (A) Bromonium ion formation
 - (B) Carbocation formation
 - (C) Carbanion formation
 - (D) None of the above
16. Cis-2 butene on reaction with bromine in carbon tetra chloride gives :
- (A) Racemic mixture
 - (B) Meso compound
 - (C) Mono bromo product
 - (D) Gem-dibromo product
17. Addition of halogen to cyclohexene confirms :
- (A) Carbocation formation
 - (B) Carbanion formation
 - (C) Bromonium ion formation
 - (D) Both (A) and (B)

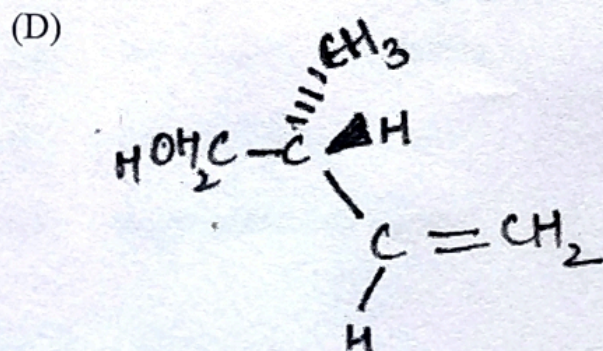
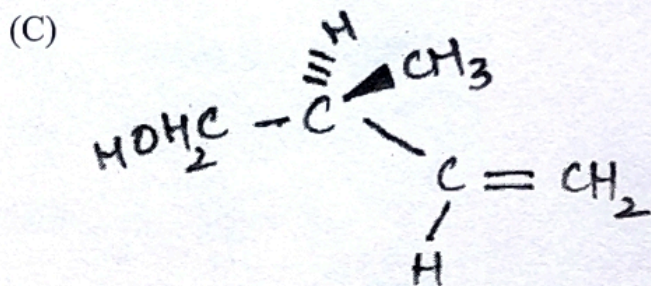
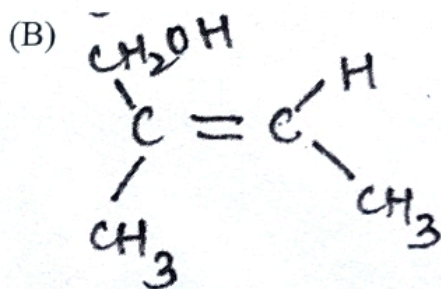
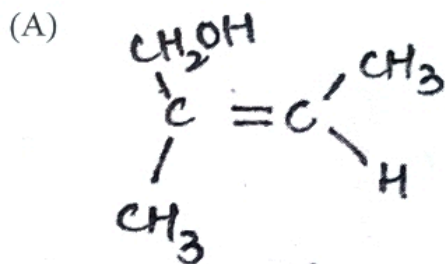
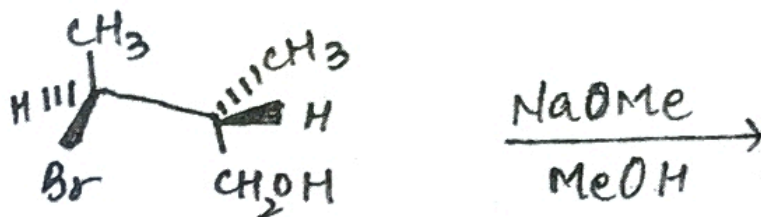
18. Which of the following chlorohydrins could be formed by addition of Cl_2 in water to an alkene?



19. Which is the main product of the following reaction :



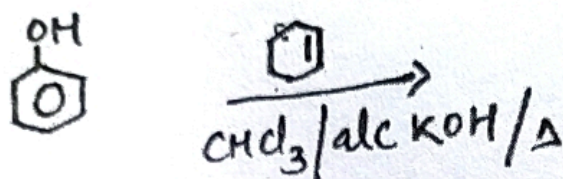
20. Which is the main product of the following reaction :



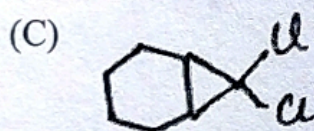
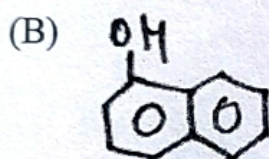
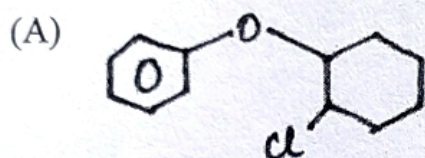
21. Mechanism of hydrolysis of carboxylic ester can be determined by-

- (A) Isotopic labelling
- (B) Crossover experiment
- (C) Identification of intermediate
- (D) Both (B) and (C)

22. Product of the following reaction is :

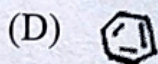
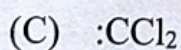
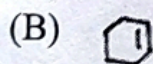
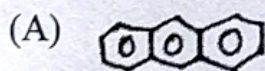


A

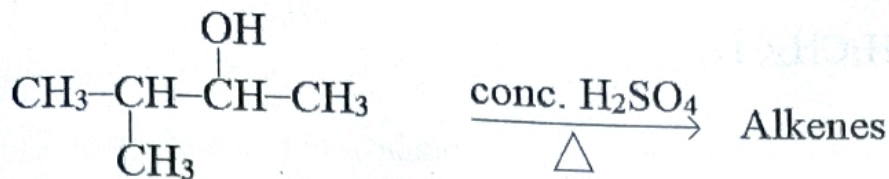


(D) None of these

23. Which of the following is not used as trapping agent :



24. In the given reaction :



Number of alkenes will be :

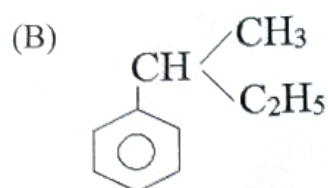
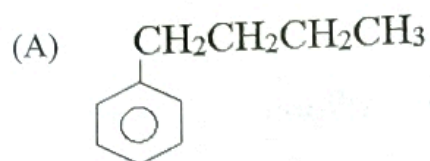
- (A) One
 - (B) Two
 - (C) Three
 - (D) Four
25. NGP leads to ----- of configuration :

- (A) Invention
- (B) Retention
- (C) Change Racemization
- (D) Racemic mixture

26. NGP is also known as :

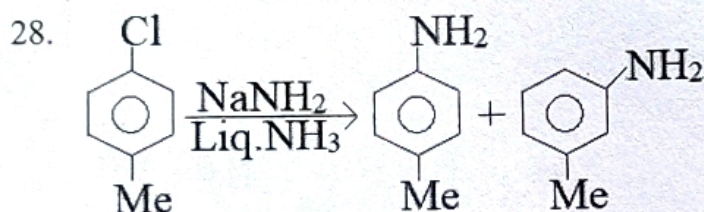
- (A) Electrophilic substitution
- (B) Nucleophilic substitution
- (C) Nucleophilic assistance
- (D) Anchimeric assistance

27. Benzene reacts with 1-chlorobutane to give :



(C) Both (A) and (B)

(D) None of these



The above reaction is an example of :

(A) Nucleophilic substitution of addition-elimination mechanism

(B) Electrophilic substitution of addition-elimination mechanism

(C) Radical substitution reaction

(D) Nucleophilic substitution involving benzyne intermediate

29. S_N' reaction on optically active substrates mainly gives :

(A) Retention in configuration

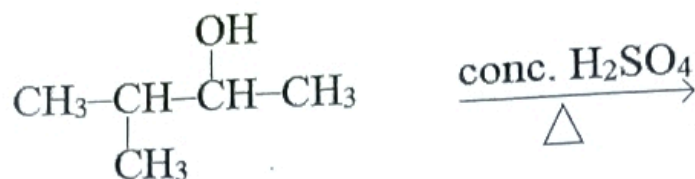
(B) Inversion of configuration

(C) Racemic product

(D) No product

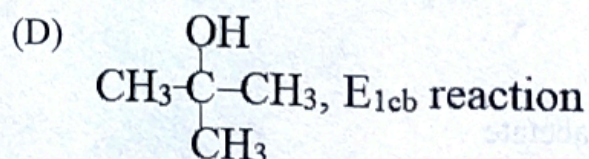
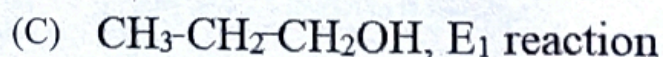
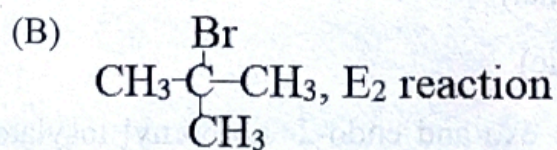
30. Conversion of cyclohexene to cyclohexanol can be conveniently achieved by :
- (A) $\text{NaOH} - \text{H}_2\text{O}$
 - (B) $\text{Br}_2 - \text{H}_2\text{O}$
 - (C) Hydroboration oxidation
 - (D) Hydroboration, hydrolysis
31. The Saytzeff's rule :
- (A) Determines regioselectivity in reactions of alkene formation
 - (B) Determines stereoselectivity in reactions of alkene formation
 - (C) Accounts for the alkene stability order
 - (D) Explains the Hammond postulate
32. Oxymercuration-demercuration reaction of 1-methylcyclohexene gives :
- (A) Cis-2 methyl cyclohexanol
 - (B) Trans-2 methyl cyclohexanol
 - (C) 1-methylcyclohexanol
 - (D) Mixture of cis and trans-2- methylcyclohexanol
33. Which of the following reaction proceeds without formation of any intermediate?
- (A) $\text{S}_{\text{N}}1$ (Substitution nucleophilic unimolecular)
 - (B) $\text{S}_{\text{N}}2$ (Substitution nucleophilic bimolecular)
 - (C) $\text{S}_{\text{N}}\text{i}$ (Substitution nucleophilic internal)
 - (D) S_{N}^1 (Substitution nucleophilic allylic)
34. The solvolysis reaction of diastereomeric exo-and endo-2- norbornyl tosylate in acetic acid gives :
- (A) Exo-2- norbornyl acetate
 - (B) Endo-2- norbornyl acetate
 - (C) Both exo-and end-2- norbornyl acetate
 - (D) None of the above

35. In the give reaction :



Number of alkenes formed will be :

- (A) One
 - (B) Two
 - (C) Three
 - (D) Four
36. Kinetics of substitution with NGP is :
- (A) First order
 - (B) Second order
 - (C) Cant be commented
 - (D) Third order
37. Which one of the following is correctly matched :



38. Cannizzaro reaction is given by :
- (A) $\text{CCl}_3 - \text{CHO}$
- (B) $\text{CBr}_3 - \text{CHO}$
- (C) CH_3CHO
- (D)
$$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CHO} \\ | \\ \text{CH}_3 \end{array}$$
39. Knoevenagel reaction involves the interaction of an aromatic aldehyde and an active methylene compound in the presence of an amine like-
- (A) Piperidine
- (B) Methylamine
- (C) Aniline
- (D) Azole
40. Which alkyl halide will give SN_2 reaction?
- (A)
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2\text{Br} \\ | \\ \text{CH}_3 \end{array}$$
- (B)
$$\begin{array}{c} \text{CH}_3 \quad \text{Br} \\ | \quad | \\ \text{CH}_3 - \text{C} - \text{CH} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$$
- (C)
$$\begin{array}{c} \text{Br} \\ | \\ \text{CH}_3 - \text{CH} - \text{CH}_3 \end{array}$$
- (D)
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH}_2 - \text{C} - \text{Br} \\ | \\ \text{CH}_3 \end{array}$$
