

Rayat Shikshan Sanstha's

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Department of Chemistry

B.Sc. Part—III

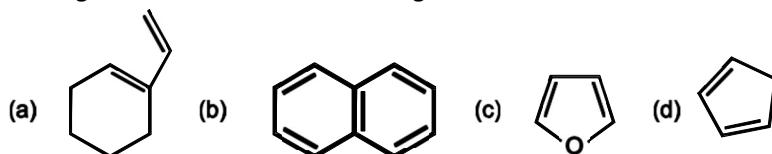
Organic Chemistry Semester VI, Paper No. IXV

Question Bank

TOPIC- 1 Name Reactions

[A] Objective Type Questions

[A] Select the most correct alternative from among those given below.



3. Diels-Alder reaction is facilitated by group in dienophile

(a) electron withdrawing (b) electron releasing
(c) both (a) and (b) (d) neither (a) nor (b)

4. Oppenauer oxidation or reaction is the opposite reaction of reaction.

(a) Wagner-Meerwein rearrangement
(b) Meerwein-Ponndorf-Verley
(c) Dieckmann's reaction
(d) Hoffmann rearrangement

5. In Oppenauer oxidation the is oxidized with aluminium tert-butoxide in excess acetone.

(a) secondary alcohol (b) primary alcohol
(c) aldehyde (d) ketone

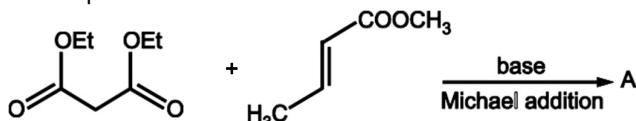
6. In reaction, aldehydes or ketones are reduced selectively to primary or secondary alcohol respectively in presence of excess of 2-propanol by reagent as aluminium terbutoxide or isopropoxide.

(a) Wagner-Meerwein rearrangement
(b) Meerwein-Ponndorf-Verley reduction

(c) Diels-Alder

(d) Favorskii

15. In the following reaction product A is



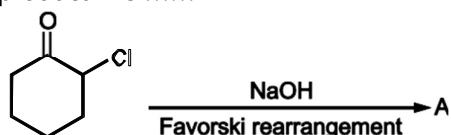
(a) diester

(b) triester

(c) tricarboxylic acid

(d) olefin

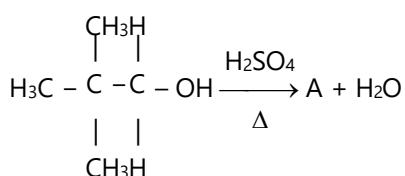
16. In the following reaction, product A is



(a) cyclohexane carboxylic acid (b) cyclohexanol

(c) cyclopentane carboxylic acid (d) cyclopentanone

17. In the following reaction, product A is



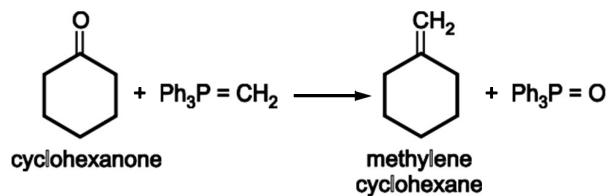
(a) 2-methyl 2-butene

(b) neopentane

(c) 2, 2-dimethyl propene

(d) tert butanol

18. The following reaction is



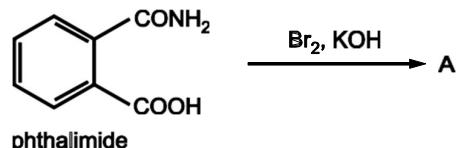
(a) Michael

(b) Dieckmann's

(c) Diels-Alder

(d) Wittig

19. The product A in the given reaction is



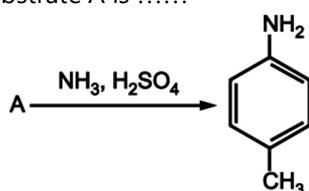
(a) 2-amino benzoic acid

(b) 2-bromo phthalimide

(c) phthalic acid

(d) benzoic acid

20. In the following reaction, the substrate A is



- | | |
|--------------|------------------|
| (a) aniline | (b) p-tulic acid |
| (c) p-cresol | (d) toluene |

Answer:

1. (d) Diels-Alder reaction, 2. (b) Naphthalene, 3. (a) electron withdrawing, 4. (b) Meerwein-Ponndorf-Verley, 5. (a) secondary alcohol, 6. (b) Meerwein-Ponndorf-Verley reduction, 7. (a) Meerwein-Ponndorf-Verley reduction, 8. (c) Schmidt rearrangement, 9. (b) one carbon atom less, 10. (a) N-bromamide, 11. (c) aldehydes or ketones, 12. (d) carbocations, 13. (a) Michael, 14. (b) Dieckmann's, 15. (b) trimester, 16. (c) cyclopentane carboxylic acid, 17. (a) 2-methyl 2-buten, 18. (d) Wittig, 19. (a) 2-amino benzoic acid, 20. (b) p-tulic acid.

[B] Long and Short Answer Type Questions:

1. What are name reactions?
2. Discuss the mechanism of the following reactions with suitable example.

OR

3. Write any two synthetic applications of the following:
 - (a) Diels-Alder reaction
 - (b) Oppenauer oxidation
 - (c) Meerwein-Ponndorff-Verley reduction
 - (d) Schmidt rearrangement
 - (e) Hofmann rearrangement
 - (f) Wittig reaction
 - (g) Wagner-Meerwein rearrangement
 - (h) Favorskii rearrangement
 - (i) Michael reaction
 - (j) Dieckmann's reaction or condensation

Topic II. Reagents in Organic Synthesis

1. Answer the following:

(a) What are the reagents? Give its significance in Organic synthesis.

(b) Give the applications of the following reagents.

1. Lithium aluminium hydride LiAlH_4
2. Osmium tetroxide (OsO_4)
3. Dicyclohexyl Carbodiimide (DCC)
4. Raney Nickel (Na-H)
5. 2,3-Dichloro -5,6-dicyano – 1,4-benzoquinone (DDQ)
6. Polyphosphoric acid (PPA)
7. Diazomethane (CH_2N_2)
8. Ceric ammonium nitrate (CAN)
9. N-Bromosuccinamide (NBS)
10. Selenium dioxide (SeO_2)

(c) Give the method of preparation of following reagents.

- i) LiAlH_4 ii) OsO_4 iii) DCC iv) Raney Nickel v) DDQ vi) PPA vii) CH_2N_2 viii) CAN ix) NBS x) SeO_2

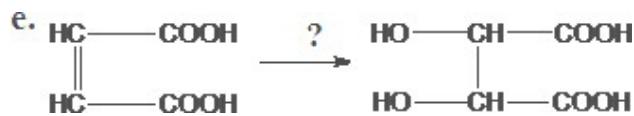
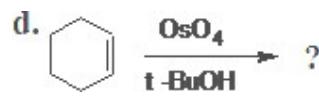
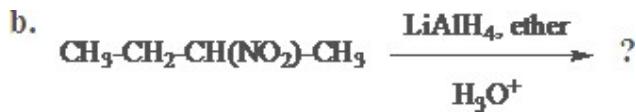
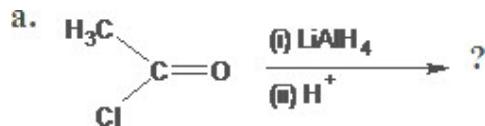
(d) Give the synthesis and applications of following reagents.

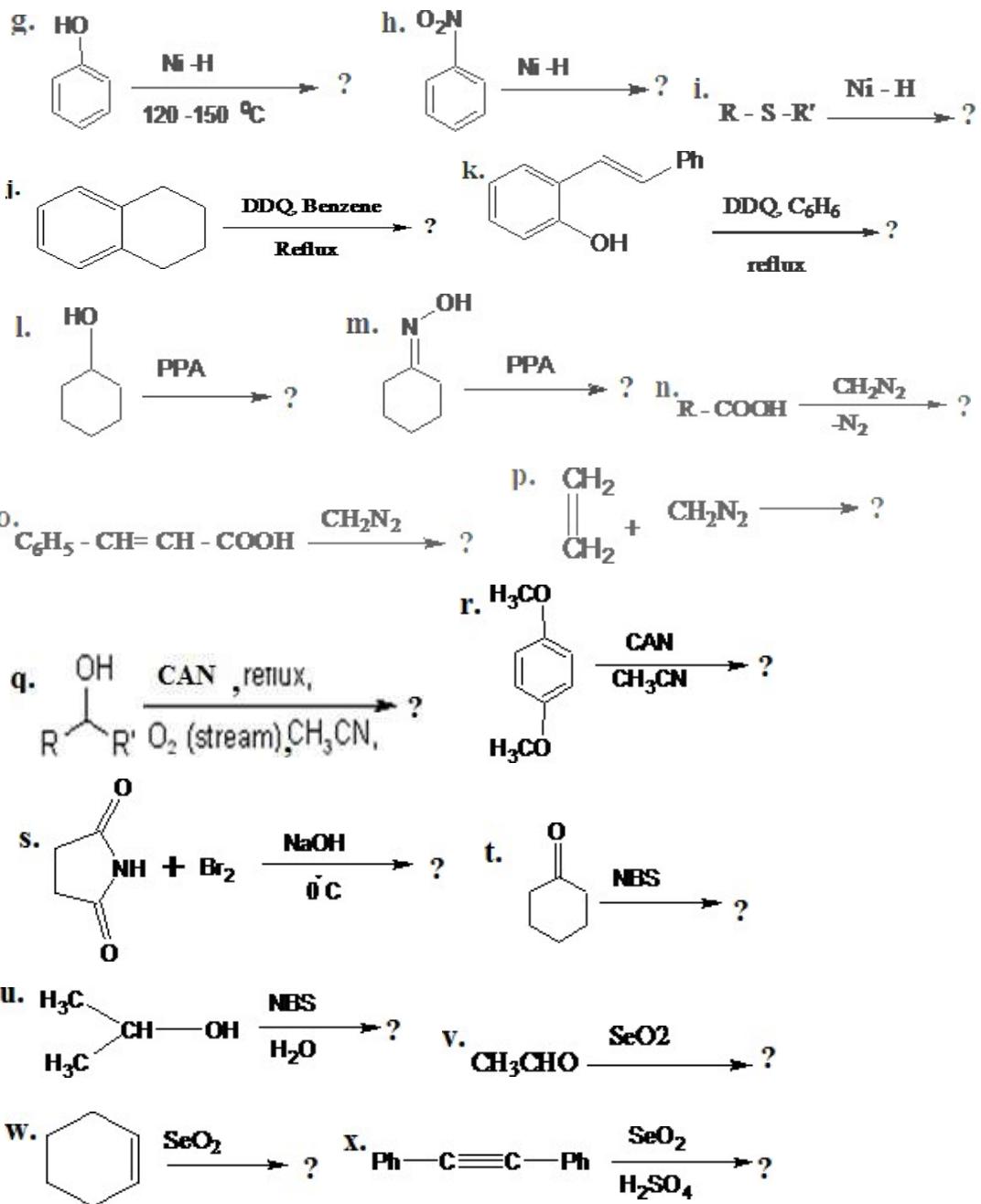
1. Lithium aluminium hydride
2. Osmium tetroxide
3. Dicyclohexyl Carbodiimide
4. Raney Nickel
5. 2,3-Dichloro -5,6-dicyano – 1,4-benzoquinone
6. Polyphosphoric acid
7. Diazomethane
8. Ceric ammonium nitrate
9. N-Bromosuccinamide
10. Selenium dioxide (SeO_2)

2. Write short note on:

- i) LiAlH_4 ii) OsO_4 iii) DCC iv) Raney Nickel v) DDQ vi) PPA vii) CH_2N_2 viii) CAN ix) NBS x) SeO_2

3. Predict the product with justification.





4. Multiple Choice Questions:

- (i) LAH is useful reagent for reduction of compounds.
- carbonyl
 - olefinic
 - parafinic
 - aromatic
- (ii) LAH acts as agents.
- dehydrating
 - hydrating
 - oxidizing
 - reducing

(iii) Reduction of halides with LAH gives.....

- (a) Hydroxy compounds (b) alkynes (c) alkanes (d) alkenes

(iv) The conversion of $-NO_2$ group to $-NH_2$ group takes place by using... reagents.

- (a) LAH (b) DCC (c) DDQ (d) OsO_4

(v) Reduction of nitriles by LAH gives.....

- (a) alkanes (b) alkenes (c) amines (d) nitro compounds

(vi) syn-hydroxylation of alkene is carried out by reagent.

- (a) LAH (b) DCC (c) Ni-H (d) SeO_2

(vii) Oxidation of anthracene by OsO_4 yields.....

- (a) Phenol (b) tetrol (c) naphthalene-2,3-dicarboxylic acid (d) quinol

(viii) When malic acid is treated with OsO_4 gives.....

- (a) citric acid (b) tartaric acid (c) fumaric acid (d) succinic acid

(ix) Oxidation of alkenes by OsO_4 in presence of $NaIO_4$ gives.....

- (a) carbonyl compounds (b) hydroxy compounds (c) carboxylic acids

(d) esters

(x) Osmylation of alkenes with osmium tetra oxide yields.....

- (a) 1,4-diols (b) 1,2-diols (c) 1,5-diols (d) 1,1-diols

(xi) DCC is a..... agent.

- (a) hydating (b) dehydrating (c) oxidizing (d) reducing

(xii) Oxidation of dicyclohexyl urea with p-toluene sulfonyl chloride in hot pyridine yields.....

- (a) DDQ (b) LAH (c) DCC (d) SeO_2

(xiii) Reaction of acid and alcohol in presence of DCC gives.....

- (a) esters (b) acids (c) alcohols (d) ketones

(xiv) Carboxylic acid with H₂O₂ under mild condition in the presence of DCC.....

- (a) diacyl chloride (b) diacyl amine (c) diacyl peroxide (d) diacyl ester

(xv) When malonic acid is treated with DCC, it gives.....

- (a) barbituric acid (b) benzoic acid (c) cinnamic acid (d) fumaric acid

(xvi) Raney nickel is used for.....

- (a) hydrogenation (b) hydrolysis (c) oxidation (d) dehydration

(xvii) Reaction of ethene with Ni-H gives.....

- (a) ethyne (b) ethane (c) acetylene (d) alkyne

(xviii) Reduction of phenol in presence of Raney nickel at 120-150°C gives.....

- (a) cyclohexane (b) benzene (c) cyclohexanol (d) hexane

(xix) Hydrogenation of naphthalene by Raney nickel at 200°C under 200-300atm. gives.....

- (a) decaline (b) tetralin (c) benzene (d) cyclohexane

(xx) DDQ is mainly used as reagent.

- (a) oxidizing (b) reducing (c) dehydrating (d) dehydrogenating

(xxi) Tetralin on dehydrogenation with DDQ gives.....

- (a) naphthalene (b) anthracene (c) benzene (d) phenanthrene

(xxii) In intramolecular cyclisation by DDQ occurs by abstraction of

- (a) proton (b) electron (c) hydride (d) positron

(xxiii) PPA is oligomer of.....

- (a) H₃PO₄ (b) H₂SO₄ (c) HCl (d) HNO₃

(xxiv) Oxidation of red phosphorus in presence of nitric acid gives.....

- (a) HNO_3 (b) HCl (c) H_3PO_4 (d) H_2SO_4

(xxv)acid is used in dentistry.

- (a) H_3PO_4 (b) H_2SO_4 (c) HCl (d) HNO_3

(xxvi) Dehydration of cyclohexanol with PPA gives.....

- (a) cyclohexene (b) cyclohexane (c) hexane (d) hexene

(xxvii) Reductive decyanation has been carried out by reagent.

- (a) DDQ (b) LAH (c) Na-H (d) PPA

(xxviii) Conversion of cyclohexanoxime in to caprolactam takes place by using...reagent.

- (a) DDQ (b) SeO_2 (c) PPA (d) Na-H

(xxix) Reaction of aniline and glycerol in presence of PPA yields.....

- (a) quinoline (b) phenol (c) quinine (d) quinol

(xxx) When carboxylic acid reacts with diazomethane gives.....

- (a) ester (b) alcohol (c) amine (d) amide

(xxxi) Amines are methylated by diazomethane in presence of.....

- (a) AlCl_3 (b) BF_3 (c) Br_2 (d) NaN_3

(xxxii) Reaction of $\text{CH}_2=\text{CH}_2$ and CH_2N_2 yields.....

- (a) pyrrole (b) pyridine (c) pyrazoline (d) benzene

(xxxiii) Representation of Ceric ammonium nitrate is.....

- (a) $(\text{NH}_4)_2\text{Ce}(\text{NO}_3)_6$ (b) $(\text{NH}_4)_6\text{Ce}(\text{NO}_3)_2$ (c) $(\text{NH}_4)_4\text{Ce}(\text{NO}_3)_4$ (d) $(\text{NH}_4)_3\text{Ce}(\text{NO}_3)_5$

(xxxiv)reagent is used as deprotection agent.

- (a) DDQ (b) CAN (c) DCC (d) NBS

(xxxv) Oxidation of sulfides to sulfoxides is carried out by using.....reagent.

- (a) SiO₂
- (b) CAN
- (c) DCC
- (d) DDQ

(xxxvi) In presence of CAN, 1,4-dimethoxy benzene is converted into

- (a) 1,4-benzoquinone
- (b) phenone
- (c) phenol
- (d) benzene

(xxxvii) NBS is used as.....reagent.

- (a) reducing
- (b) oxidizing
- (c) dehydrating
- (d) brominating

(xxxviii) In presence of NBS, the conversion of isopropyl alcohol takes place in to

- (a) acetaldehyde
- (b) acetone
- (c) formaldehyde
- (d) dimethyl ether

(xxxix) The conversion of cyclohexene into bromohydrin takes place in presence of

- (a) NBS
- (b) SeO₂
- (c) Na-H
- (d) DDQ

(xl) The bromination of succinimide in NaOH at 0°C yields.....

- (a) NBS
- (b) DCC
- (c) DDQ
- (d) LAH

(xli) Allylic bromination is carried out by using reagent.

- (a) LAH
- (b) NBS
- (c) DDQ
- (d) DCC

(xlii) Oxidation of acetaldehyde by SeO₂ gives.....

- (a) glycolic acid
- (b) glyoxal
- (c) acetic acid
- (d) formaldehyde

(xlii) SeO₂ act asreagent.

- (a) hydrating
- (b) dehydrating
- (c) hydrogenating
- (d) dehydrogenating

(xliv) Allylic hydroxylation is carried out by usingreagent.

- (a) SeO₂
 - (b) NBS
 - (c) DCC
 - (d) LAH
-

Answer:

- (i) (a) carbonyl ;(ii) (d) reducing; (iii) (c) alkanes ; (iv) (a)LAH ; (v) (c) amines;
- (vi) (a) LAH ; (vii) (b) tetrol ; (viii) (b) tartaric acid ; (ix) (a) carbonyl compounds ; (x) (a) 1,4-diols ; (xi) (b)dehydrating ; (xii) (c) DCC ; (xiii) (a) esters ; (xiv) (c) diacyl peroxide ;(xv) (a) barbituric acid ; (xvi) (a) hydrogenation ; (xvii) (b) ethane ; (xviii) (c) cyclohexanol ; (xix) (a) decaline ;
- (xx) (d) dehydroganatng; (xxi) (a) naphthalene; (xxii) (c) hydride ; (xxiii) (a) H_3PO_4 ; (xxiv) (c) H_3PO_4 ; (xxv) (a) H_3PO_4 ; (xxvi) (a) cyclohexene; (xxvii) (d) PPA; (xxviii) (c) PPA ; (xxix) (a) quinoline ; (xxx) (a) ester ; (xxxi) (b) BF_3 ;
- (xxxii) (c) pyrazoline ; (xxxiii) (a) $(\text{NH}_4)_2\text{Ce}(\text{NO}_3)_6$; (xxxiv) (b) CAN ; (xxxv) (b) CAN ; (c) (xxxvi) (a) 1,4-benzoquinone ; (xxxvii) (d) brominating; (xxxviii) (b) acetone ;(xxxix) (a) NBS ; (xxxix) (a) NBS ; (xxxx) (b) NBS; (xxxxi) (b) glyoxal ; (xxxxii) (d) dehydrogenating; (xxxxiii) (a) SeO_2 ;
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Topic III.-Electrophilic addition to Carbon Double and Triple Bonds

Answer the following

- (a) State Markovnikoff's rule with suitable example.
- (b) Propylene reacts with HBr and forms 2-bromopropane as a major product. Why?
- (c) Cis-2-butene on hydroxylation by KMnO₄ gives a meso 1, 2-diol. Why?
- (d) The hydrogen attached to triply bonded carbon is more acidic. Explain with example.
- (e) What is the product when ethylene is first treated with B₂H₆ and then with alkaline H₂O₂?
- (f) 2-butene on reduction with Na/NH₃ (liquid) gives trans-2-butene. Explain.
- (g) Give the mechanism of addition of bromine to propene.
- (h) Discuss the mechanism of addition of HBr to propene. Explain peroxide effect.
- (i) What is ozonolysis? Explain the mechanism of addition of O₃ molecule to 2-butane.
- (j) Explain the mechanism of addition of water to propene in the acidic medium.
- (k) Explain the hydroxylation of alkene by KMnO₄.
- (l) What is hydrogenation? Explain the mechanism of hydrogenation of propene in presence of metal catalyst.
- (m) Explain with mechanism when 2-methyl propene reacts with HBr in presence of peroxide.
- (n) Write the hydroboration-oxidation of alkene with example.
- (o) Trans 2-

Topic IV : Natural Products

Answer the following:

- ((a) What are terpenes? How are they classified? What are the different methods for isolation of terpenoids from natural sources?
- ((b) Discuss the general analytical methods used for determination of structure of terpenoids.
- (c) What are alkaloids? How are they classified? Describe the general method of extraction of alkaloids from natural sources.
- (d) Discuss the general analytical methods used for determination of structure of alkaloids.
- (e) How will you establish the structure of citral on the basis of analytical and synthetic evidence?
- (f) How will you establish the structure of α -terpineol on the basis of analytical and synthetic evidence?
- (g) How will you establish the structure of ephedrine on the basis of analytical and synthetic evidence?
- (h) How will you establish the structure of nicotine on the basis of analytical and synthetic evidence?
- (i) Give the synthesis of:
 - (i) Citral, (ii) α -Terpineol, (iii) Nicotine, (iv) Ephedrine, (v) Methylheptenone, (vi) Terpenylic acid, (vii) Terebic acid
- (j) How will prove the following?
 - (i) The presence of two carbon-carbon double bonds in citral
 - (ii) The presence of α,β -unsaturated aldehyde in citral
 - (iii) The presence of isopropylidene group in citral
 - (iv) The acyclic nature of citral
 - (v) The presence of pyridine ring in nicotine
 - (vi) Nicotine is a tertiary base
 - (vii) Monocyclic nature of α -terpineol
 - (viii) α -terpineol contains para-cymene
 - (ix) α -terpineol is a tertiary alcohol
 - (x) The presence of benzene ring in ephedrine

- (xi) Nature of side chain in ephedrine
 - (xii) Presence of methoxy group ($-OCH_3$) in natural products
 - (xiii) Nature of oxygen function in ephedrine
 - (xiv) Nature of nitrogen atom in ephedrine
 - (xv) The presence of secondary alcoholic group in ephedrine
 - (xvi) The presence of $-NHCH_3$ group in ephedrine
 - (xvii) The presence of pyridine and N-methyl pyrrolidine rings in nicotine
- (k) Give the significance of the following:
- (i) Citral on treatment with Br_2 gives tetrabromocitral
 - (ii) Ozonolysis of citral gives acetone as one of the products
 - (iii) Citral on mild oxidation with Ag_2O gives geranic acid
 - (iv) Ephedrine on oxidation gives benzoic acid
 - (v) Ephedrine on heating with HCl acid forms methylamine and propiophenone
- (l) Write short notes on:
- (i) Isoprene rule
 - (ii) Stereochemistry of citral
 - (iii) Hoffmann's exhaustive methylation or Hoffmann's degradation
 - (iv) Emde's degradation
 - (v) Von Braun degradation
 - (vi) Zeisel's method
- (m) How are the following conversions effected?
- (i) Methyl heptanone into citral
 - (ii) Benzaldehyde into ephedrine
 - (iii) 1-phenylpropane-1, 2-dione into ephedrine
 - (iv) 2, 4-dibromo-2-methylbutane into citral
 - (v) Pyridine into 1, 3-pentadiene
 - (vi) Ethyl aceto acetate into terpenylic acid
 - (vii) Nicotinic ester into nicotine

Q. 1 Multiple Choice Questions:

1. Terpenes are products.
 - (a) synthetic
 - (b) natural
 - (c) organic
 - (d) plant origin
2. Terpenes contain in its structure.
 - (a) pentene
 - (b) nicotine
 - (c) isoprene
 - (d) dipentene
3. Sesquiterpene contains no of isoprene unit.
 - (a) 2
 - (b) 3
 - (c) 4
 - (d) 5
4. Citral on mild oxidation gives
 - (a) citric acid
 - (b) aldehyde
 - (c) geranic acid
 - (d) geranol

- (c) threo, threo (d) erythro, erythro

19. Reduction of cis-citral gives

(a) geranic acid (b) geraniol
(c) nerol (d) terebic acid

20. The method that can not be used to open the heterocyclic ring of an alkaloid is method.

(a) Emde's (b) Van Brown
(c) Herzig (d) Hofmann

21. Quaternary ammonium hydroxide lacking β -hydrogen atoms do not undergo reaction.

(a) Herzig-Meyer's (b) Zerewitinoff's
(c) Hofmann's (d) Zeisel's

22. Estimation of alkoxy group of alkaloid is done by method.

(a) Zerewitinoff's (b) Hofmann's
(c) Zeisel's (d) Herzig-Meyer's

Answer:

1. (b) natural; 2. (c) isoprene; 3. (d) 5; 4. (c) geranic acid; 5. (c) aldehyde; 6. (c) acyclic; 7. (c) 238 nm; 8. (c) p-cymene; 9. (d) monocyclic; 10. (a) alcohol; 11. (c) tertiary; 12. (d) α -terpeniol; 13. (a) pyridine; 14. (a) dipentene; 15. (a) nicotyrine; 16. (b) benzoic acid; 17. (b) secondary amine; 18. (a) erythro, threo; 19. (c) nerol; 20. (c) Herzig; 21. (c) Hofmann's; 22. (c) Zeisel's.

TOPIC 4: Pharmaceuticals

1. Answer the following:

- 1) What are the pharmaceuticals? Give its classification.
- 2) What are antibiotic drugs? Give the synthesis of chloramphenicol.
- 3) What are the drugs? What qualities are required for an ideal drug.
- 4) What are functional drugs? Explain the different functional drugs.
- 5) Give the classification of drugs based as chemotherapeutic agents.
- 7) Give synthesis of proguanil and its use.
- 9) Give synthesis of the following drugs.
 - a) antibiotic drug b) CNS drug c) antitubercular drug d) antimalarial drug
- 10) Give the synthesis and uses of the following drugs.
 - a) paludrin b) ethambutol c) phenobarbitone d) Isoniazide
 - e) tolbutamide
 - f) chloramphenicol g) benzocaine
- 11) Explain the drug action of sulpha drug

2. Multiple Choice Questions:

- i) An ideal drug must not induce in body.
 - a) resistance b) hunger c) curative action d) sleep
- ii) Tranquilizer is a -----functional drug.
 - a) Antipyretic b) CNS c) anti inflammatory d) antitubercular
- iii) ----- is antimalarial drug.
 - a) Proguanil b) isonizide c) phenobarbitone d) Tolbutamide
- iv) Ibuprofen is an -----drug.
 - a) antimalarial b) antibiotic c) antidiabetic d) antiinflammatory

v) Malaria is caused due to ----- -.

- a) bacteria
- b) virus
- c) protozoa
- d) fungi

vi) -----is applied on the non living surface .

- a) Antiseptic
- b) antimalarial
- c) antipyretic
- d) disinfectant

vii) Local response to injury is called as -----.

- a) Histamine
- b) inflammation
- c) hypertension
- d) diabetes

viii) Antipyretic are the drugs which -----body temperature incase of fever.

- a) decrease
- b) increase
- c) maintain constant
- d) zero

ix) ----- is antidiabetic drug .

- a) Isoniazid
- b) ethambutol
- c) tolbutamide
- d) ibuprofen

X) Chloramphenicol is ----- drug.

- a) antiseptic
- b) antibiotics
- c) antimalarial
- d) antipyretic .

xi) --- these drugs are used to treat heart disorder.

- a) Cardiac
- b) CNS
- c) Antiseptic
- d) antibiotics

xii) The drug which are used in treatment of cancer is called as...drug.

- a) antineoplastic
- b) antiseptic
- c) antidiabetic
- d) Cardiac

Answer:

- i) a) resistance ; ii) b) CNS; iii) a) Proguanil ; iv) d) anti-inflammatory ;
 - v) c) protozoa; vi) d) disinfectant; vii) b) inflammation ; viii) a) decrease ;
 - ix) c) tolbutamide; X) b) antibiotics ; xi) a) Cardiac ; xii) a) antineoplastic;
-