

Seat No. _____

Enrollment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY

M.Sc. (Organic Chemistry) – SEMESTER 4 SUMMER (REGULAR) 2022 EXAMINATION

Course Title: Natural Products

Course Code: 101330401

Total Printed Pages : 02

Date: 11/04/2022

Time: 10.00 am to 12.00 pm

Maximum Marks: 60

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

- Q. 1** Answer the following multiple choice questions. (12)
- (1) Biotin upon reaction with barium hydroxide at 140 °C gives _____.
(a) diamino carboxylic acid and carbon dioxide
(b) diamino carboxylic acid and carbon monoxide
(c) monoamino carboxylic acid and carbon dioxide
(d) monoamino carboxylic acid and carbon monoxide
 - (2) Riboflavin upon reaction with NaOH in the presence of light forms _____.
(a) lumichrome (b) lumi-lactoflavin (c) alloxazine (d) urea
 - (3) No. of double bond equivalent value for Vitamin A₁ is _____.
(a) 3 (b) 4 (c) 5 (d) 6
 - (4) Morphine upon reaction with CH₃I/KOH, followed by oxidation with CrO₃ produces _____.
(a) codeinone (b) codeine (c) apomorphine (d) morphol
 - (5) Which of the following statements are incorrect for Tropine?
(i) It has one nitrogen atom and it is secondary
(ii) It is a bicyclic compound
(iii) It has a secondary hydroxyl group.
(iv) Tropine upon oxidation with CrO₃ gives pimelic acid.
(a) (i) & (iv) (b) (ii) & (iv) (c) (iii) & (iv) (d) (i) & (ii)
 - (6) Double bond equivalent value for Cinchonine is _____.
(a) 12 (b) 11 (c) 10 (d) 9
 - (7) Which of the following statements are incorrect for α-Cadinene?
(i) It has two double bond and both are present in the same ring.
(ii) It gives dihydro cadinene upon catalytic reduction.
(iii) It is a bicyclic compound. (iv) It is a sesquiterpenoid.
(a) (i) & (ii) (b) (ii) & (iii) (c) (iii) & (iv) (d) (ii) & (iv)
 - (8) Which of the following product is *NOT* formed during decomposition study of β-Carotene?
(a) toluene (b) *o*-xylene (c) 2,6-dimethylnaphthalene (d) *m*-xylene
 - (9) Number of isoprene units in sesquiterpenoids is _____.
(a) 6 (b) 5 (c) 4 (d) 3
 - (10) Position of angular methyl groups in Cholesterol is at _____.
(a) C₁₀ & C₁₇ (b) C₈ & C₁₃ (c) C₁₀ & C₁₃ (d) C₉ & C₁₃
 - (11) Which of the following is female sex hormone?
(a) Cortisone (b) Oestrogen (c) Testosterone (d) none of them

- (12) When conc. H_2SO_4 is added to solution of cholesterol in chloroform, it gives _____ colour.
 (a) green (b) blue (c) yellow (d) red
- Q. 2** Attempt **any eight** of the following. (16)
- (1) Write the synthesis of N-methyl-4,5-diamino-o-xylene from o-xylene.
 - (2) Write down the sources and functions of Vitamin- A_1 .
 - (3) Give the chemical evidences for the presence of thio ether linkage in Biotin.
 - (4) Write the synthesis of 2-ethyl pyridine from Tropine.
 - (5) Discuss Hofmann exhaustive methylation via citing suitable example.
 - (6) Write the synthesis of Tylophorine.
 - (7) Explain the isoprene rule.
 - (8) Write the synthesis of α -Cadinene dihydrochloride.
 - (9) Explain Blanc's rule.
 - (10) Give the products formed during selenium dehydrogenation of steroids at higher temperature.
- Q. 3** Discuss the structure of Vitamin B_6 along with its synthesis. (08)
- OR**
- Q. 3** The sodium sulphite cleavage of Vitamin B_1 results in to compound A (08)
 having molecular formula C_6H_9NOS and compound B having molecular formula $C_6H_9N_3O_3S$. Discuss the structure of compound with basic property along with its synthesis.
- Q. 4** Give evidences for the (08)
- a) Presence of cyclic 3°-nitrogen in morphine and it has attachment of methyl group.
 - b) Position of cyclic ether linkage present in morphine.
- OR**
- Q. 4** Cinchonine upon chromic acid oxidation gives cinchoninic acid (08)
 meroquinene, Discuss the structure of meroquinene.
- Q. 5** Give evidences for the (08)
- a) Position of double bond and hydroxyl group in β -Eudesmol.
 - b) Symmetric structure of β -Carotene.
- OR**
- Q. 5** Answer the followings. (08)
- a) Discuss Campbell and Soffer's work for establishing position of double bond in α -Cadinene.
 - b) Discuss the biogenesis of monoterpenoids using mevalonic acid pathway.
- Q. 6** Give the evidence for the nature of side in Cholesterol and also explain (08)
 steps involved in Barbier-Wieland degradation.
- OR**
- Q. 6** Answer the followings. (08)
- a) Give the evidence for position of double bond in Cholesterol.
 - b) Write the synthesis of Oestrogen.

Seat No. _____

Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY
MASTER OF SCIENCE (ORGANIC CHEMISTRY) – SEMESTER 4
SUMMER 2022 EXAMINATION

Course Title: Medicinal Chemistry

Course Code: 101330402

Total Printed Pages: 03

Date: 12/04/2022

Time: 10:00 am to 12:00 noon

Maximum Marks: 60

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.
- Draw a diagram wherever necessary.

Q. 1

Answer the following multiple-choice questions.

(12)

- (1) The contraction produced in mayo cardinal tissue of heart is controlled by _____.
(a) Pacemaker cell (b) sinoatrial node (c) myocardium (d) both (a) & (b)
- (2) The presence of _____ group is necessary for the transport of psychoactive drug in GI track?
(a) ether (b) hydroxy (c) thio (d) amido
- (3) The mechanism of antibacterial action of cephalosporins involves _____.
(a) inhibition of the synthesis of precursors of peptidoglycans
(b) interference with the synthesis of ergosterol
(c) inhibition of transpeptidation reaction
(d) inhibition of β -lactamases
- (4) An orally active drug has following properties. Which of the following dose would be most effective for 70kg patient?
 $F=0.8$, $t_{1/2a}=1\text{hr}$, $V_d=40\text{L/kg}$, $TC=25\mu\text{g/l}$, $t_{1/2e}=12\text{h}$, $MEC=10\mu\text{g/ml}$
(a) 300mg, 4 times a day (b) 100mg, 3 times a day
(c) 250mg, 3 times a day (d) 600mg, 4 times a day
- (5) What is ischemisr?
(a) Sever chest pain
(b) Temporary tightening of the muscles in the wall of one of the arteries

- (c) The suffocated condition feels by heart
 (d) Temporary relaxation of the muscles in the wall of one of the arteries
- (6) The above 90 pulses/min of heart rate cause the disease _____
 (a) brady cardia (b) CHF (c) tachy cardia (d) angina pectoris
- (7) The correct sequence of life cycle of virus is _____
 (a) penetration – adsorption – uncoating – translation
 (b) adsorption – penetration – uncoating – translation
 (c) adsorption – penetration – translation – uncoating
 (d) penetration – adsorption – translation – uncoating
- (8) Hormones and neurotransmitters need to remain active at concentration, respectively
 (a) $<10^{-8}$ M, $>10^{-4}$ M (b) $>10^{-8}$ M, $<10^{-4}$ M
 (c) $<10^{-8}$ M, $<10^{-4}$ M (d) 10^{-8} M, 10^{-4} M
- (9) Which of the following is *NOT* HIV protease inhibitors?
 (a) Nevirapine (b) Indinavir (c) Emivirine (d) Idoxuridine
- (10) _____ is very effective in preventing the recurrence of cancer in premenopausal women.
 (a) Chlorambucil (b) Mechlorethamine hydrochloride
 (c) Melphalan (d) Cyclophosphamide
- (11) Which of the following pro drug is vesicant?
 (a) Acyclovir (b) Captopril (c) Bambuterol (d) Mitomycin
- (12) Which of the following is correct combination?
 (a) Insulin & Angiotensin (b) GABA & Insulin
 (c) Acetyl choline & Angiotensin (d) Insulin & Dopamine

Q.2

Attempt any **eight** of the following.

(16)

- (1) Explain drug distribution.
 (2) Define and explain following terms.
 (a) AVD (b) F
 (3) “Phenobarbital is more active than Anobarbital.” Why?
 (4) Discuss the classification of barbiturates.
 (5) Define tumour and discuss its type.
 (6) Define the following terms.
 (a) Anxiety (b) Epilepsy
 (7) Discuss mode of action of inhibitor of nucleic acid synthesis.
 (8) Write the composition of peptidoglycan.
 (9) How antibiotic works and why its failed?
 (10) What is pro drug. Give its detail classification.

Q-3

What are chemical messengers? Explain the signalling through hormones.

[08]

OR

Q-3

Answer the following.

[08]

- (a) Explain drug administration.
 (b) What is receptor? Discuss its types in detail.

Q-4

Define antidepressant drug. Give its detail classification and also write the synthesis of isocarboxazide.

[08]

OR

Q-4

Answer the following.

[08]

- (a) What is antihypertensive agent? Discuss mode of action with suitable example.

(b) Discuss SAR and therapeutic uses of benzodiazepines in detail. [08]
Q-5 Answer the following.

(a) Define and classify antineoplastic agents. Also give mode action and synthesis of mechlorethamine hydrochloride.

(b) Define antiviral agent. Explain life cycle of virus. Classify antiviral agents.

OR

Q-5 Answer the following. [08]

(a) Discuss phase wise cell cycle.

(b) Explain the drug profile of acyclovir and rimantadine.

Q-6 Answer the following. [08]

(a) What is antibiotic? Give its classification. Discuss mode of action of penicillin drug.

(b) What is combinatorial chemistry? Explain parallel synthesis for the synthesis of tri peptide compounds.

OR

Q-6 Answer the following. [08]

(a) Compare gram (+ve) and Gram (-ve) bacteria.

(b) Give the synthesis and uses of following

(i) Enrofloxacin (ii) Chloramphenicol

THE CHARUTAR VIDYA MANDAL UNIVERSITY
M.Sc. (Organic Chemistry) – SEMESTER 4
SUMMER (REGULAR) 2022 EXAMINATION

Course Title: Stereochemistry of Organic Compounds

Course Code: 101330403

Total Printed Pages : 03

Date: 13/04/2022

Time: 10.00 AM to 12.00 PM

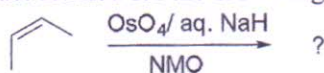
Maximum Marks: 60

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

- Q. 1** Answer the following multiple choice questions. **(12)**
- (1) A physical property that enantiomers differ from _____.
 (a) solubility (b) optical rotation
 (c) molecular weight (d) IR spectra
 - (2) In cram's rule, incoming nucleophile preferentially attacks on the side of plane containing _____ group.
 (a) small (b) large (c) medium (d) both medium and large
 - (3) Out of two possible reactive sites, reaction proceeded at only one reactive site then such reaction is called _____.
 (a) stereospecific (b) chemoselective
 (c) stereoselective (d) regioselective
 - (4) Which of the following organic base is *NOT* used as a resolving agent?
 (a) quinine (b) brucine (c) cinchonidine (d) pyridine
 - (5) Resolving agent (-)-Brucine is used in resolution of _____.
 (a) (±)- α -methyl benzyl amine (b) (±)-alanine
 (c) (±)-2-octanol (d) (±)-hexahelicene
 - (6) An optically active acid (-)-A when treated with optically active base (+)-B gives diastereomeric _____.
 (a) n-salt (b) p-salt
 (c) mixture of n- & p-salt (d) no formation of any type of salt
 - (7) Most preferred conformer of cycloheptane is _____.
 (a) twist chair form (b) chair form
 (c) boat form (d) twist boat form
 - (8) Which of the following has more puckered chair conformation?
 (a) cyclohexane (b) methyl cyclohexane
 (c) 1,2-dimethyl cyclohexane (d) piperidine
 - (9) The twist-chair-boat conformer of cyclononane has _____ symmetry.
 (a) C_2 (b) D_3 (c) C_5 (d) D_{4d}
 - (10) The overall rate of S_N2 reaction is _____.
 (a) substituted halide > benzylic halide > allylic halide
 (b) CH_3-X > substituted halide > allylic halide
 (c) substituted halide > bridgehead halide > benzylic halide
 (d) allylic halide > substituted halide > CH_3-X

(11) The product formed for the following reaction is _____.



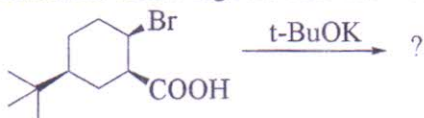
- (a) erythro & optically active compound
- (b) erythro & optically inactive compound
- (c) threo & optically active compound
- (d) threo & optically inactive compound

(12) If electron _____ group present in alkene and electron _____ group present in peracid, increases the rate of epoxide formation.

- (a) withdrawing, releasing
- (b) releasing, withdrawing
- (c) releasing, releasing
- (d) withdrawing, withdrawing

Q. 2 Attempt **any eight** of the following. **(16)**

- (1) "Hydroboration reaction of α -pinene, followed by alkaline oxidation is a substrate controlled asymmetric synthesis" justify the statement.
- (2) Explain the Prelog's rule via citing the suitable example.
- (3) Explain the use of asymmetric Wilkinson catalyst in reduction of alkene.
- (4) Discuss the resolution of alcohols.
- (5) Discuss the conformation analysis of n-propionaldehyde.
- (6) Explain the 2-alkyl ketone effect.
- (7) Discuss the conformational analysis of 2-isopropyl-5-methyl cyclohexanol.
- (8) Give the product for following reaction with reasonable mechanism.



- (9) Explain S_N1 reaction with suitable example.
- (10) Explain epoxide ring formation reaction with suitable example.

Q. 3 Answer the following. **(08)**

- 1. Illustrate the term chiral auxiliary; demonstrate the use any one chiral auxiliaries in asymmetric synthesis.
- 2. Write a note on CBS catalyst.

OR

Q. 3 "Diels alder reaction is a diastereoselective reaction" justify the statement. **(08)**

Q. 4 Answer the following. **(08)**

- 1. Describe experimental method for resolution of racemic mixture of (\pm)- α -methyl benzylamine
- 2. Discuss the conformation analysis of γ -ephedrine.

OR

Q. 4 Draw the various conformers of n-butane along with its potential energy diagram and also write a note on preferential crystallization. **(08)**

Q. 5 Discuss the conformational analysis of 1,2-, 1,3- and 1,4-dimethyl cyclohexane and also draw the various conformers of 9-methyl decalin. **(08)**

OR

Q. 5 Discuss various stereo electronic effects in oxa-cyclohexane derivatives. **(08)**

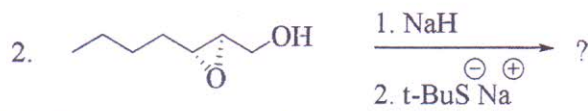
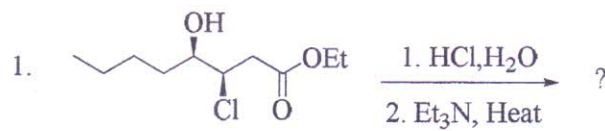
Q. 6 Answer the following. **(08)**

- 1. Explain factors affecting on nucleophilic substitution reaction.
- 2. Explain regioselectivity in bimolecular elimination reaction.

OR

Q. 6 Answer the following. **(08)**

- 1. Give the product for the following reactions with detailed reaction mechanism.



2. Explain Chugaev reaction with mechanism.

THE CHARUTAR VIDYA MANDAL UNIVERSITY

M.Sc. (ORGANIC CHEMISTRY) – SEMESTER-4

APRIL (REGULAR) 2022 EXAMINATION

Course Title: Topics In Organic Chemistry

Course Code: 101330409

Total Printed Pages : 04

Date: 14/04/2022

Time: 10.00 am to 12.00 pm

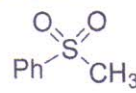
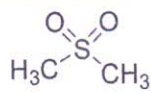
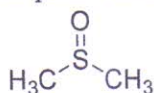
Maximum Marks: 60

Instructions:

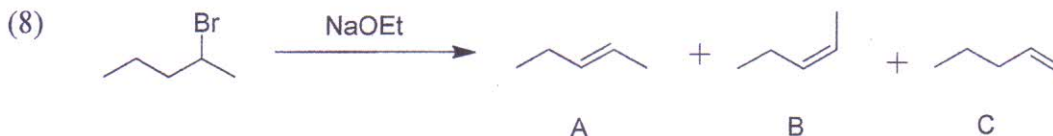
- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following multiple choice questions. **(12)**

- (1) Regarding the catalytic cycle of hydrogenation of alkene involving $\text{RhCl}(\text{PPh}_3)_3$ as the catalyst, the correct statement is _____.
 - (a) only 18-electron Rh complex involved
 - (b) 14-, 16- and 18- electrons Rh complexes are involved
 - (c) 14- and 16- electrons Rh complexes are involved
 - (d) 16- and 18- electrons Rh complexes are involved
- (2) An intermediate formed during the hydroformylation of olefins using $\text{Co}_2(\text{CO})_8$ as catalyst is _____.
 - (a) $\text{HCo}(\text{CO})_8$
 - (b) $\text{H}_4\text{Co}(\text{CO})_3$
 - (c) $\text{H}_2\text{Co}(\text{CO})_4$
 - (d) $\text{HCo}(\text{CO})_4$
- (3) Wilkinson's catalyst _____.
 - (a) is coordinatively saturated
 - (b) does not obey the 18-electron rule
 - (c) is used for oxidation of alcohols
 - (d) is an iridium complex used in preparation of important pharmaceutical product
- (4) _____ intermediate does not involve in Staudinger reaction
 - (a) Phosphine
 - (b) Phosphazide
 - (c) Phosphinimine
 - (d) all of above
- (5) The oxidation state of ruthenium in Noyori asymmetric hydrogenation is _____.
 - (a) +1
 - (b) +2
 - (c) both a or b
 - (d) +3
- (6) In Wacker oxidation, the sequence of steps involved are _____.
 - (a) hydroxypalladation, complexation, reductive elimination
 - (b) complexation, hydroxypalladation, reductive elimination
 - (c) reductive elimination, complexation, hydroxypalladation
 - (d) complexation, reductive elimination, hydroxypalladation
- (7) The correct order of pKa value for the following sulphur derivatives _____.

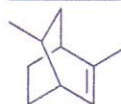


- (a) $\text{A} > \text{C} > \text{B}$ (b) $\text{B} > \text{C} > \text{A}$ (c) $\text{A} > \text{B} > \text{C}$ (d) $\text{C} > \text{B} > \text{A}$

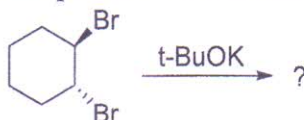


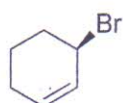

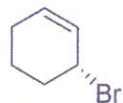

From the above reaction the % yield in decreasing order is _____.

- (a) $A > C > B$ (b) $B > C > A$ (c) $A > B > C$ (d) $C > B > A$
 (9) Alkyl halide are _____ electrophiles, silyl halide are _____ electrophiles.
 (a) hard, hard (b) soft, soft (c) hard, soft (d) soft, hard
 (10) The number of $^1\text{H-NMR}$ signal observed in _____.

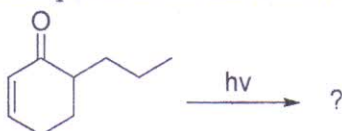


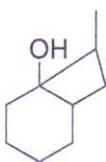
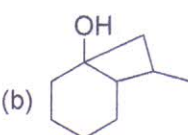
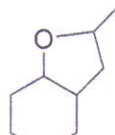
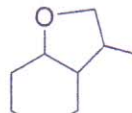
- (a) 11 (b) 8 (c) 9 (d) 10
 (11) Suggest the appropriate product for the following reaction.



- (a)  (b)  (c)  (d) 

- (12) Suggest the appropriate product for the following reaction.

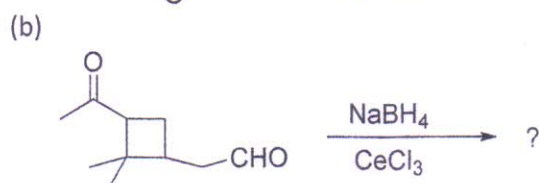
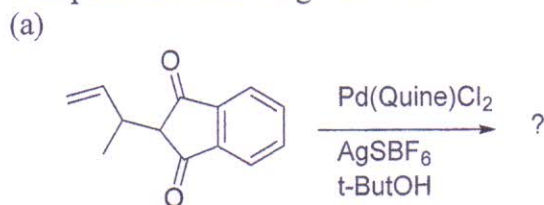


- (a)  (b)  (c)  (d) 

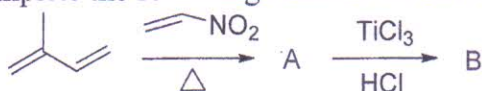
Q.2 Attempt **any eight** of the following.

(16)

- What are the basic differences between the Stille and Suzuki coupling reactions?
- Explain Bergmann cyclization.
- Define: Hepticity, Organometallic compound
- Complete the following reactions.



- (5) Complete the following reaction via showing suitable mechanism

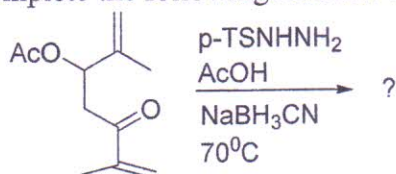


- (6) Explain anion stabilization by adjacent sulphur in dithiane.

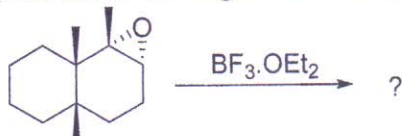
- (7) Explain ways of making single geometrical isomers of double bond.
 (8) Complete the following reaction with mechanism.



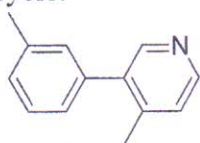
- (9) Complete the following reaction with mechanism.



- (10) Complete the following reaction with mechanism.



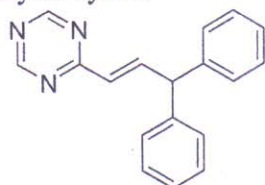
- Q.3** (a) Give the synthesis of following compound by Suzuki coupling reaction with catalytic cycle. (08)



- (b) Explain Heck Reaction with catalytic cycle in brief.

OR

- Q.3** (a) Give the synthesis of following compound by Stille cross-coupling reaction with catalytic cycle. (08)



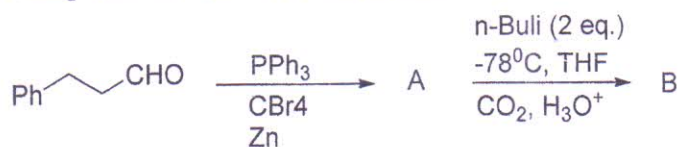
- (b) Explain Negishi Reaction with catalytic cycle in brief.

- Q.4** (a) Explain Sharpless asymmetric dihydroxylation via citing suitable example (08) and also explain its catalytic cycle.

- (b) Write the synthesis of Oseltamivir phosphate (Tamiflu).

OR

- Q.4** (a) Complete the reaction with mechanism. (08)



- (b) Explain Staudinger reaction.

- Q.5** Complete the following reactions with mechanism: (08)

