



H-143001

Seat No. _____

M. Sc. (Sem. III) Examination

November - 2019

**MSC0C301 : Organic Chemistry -
Natural Products & Biomolecules**

Time : 3 Hours]

[Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) Figures to the right indicate full marks.

1 Answer the following :

- (A) (i) What are Natural Pigments? Give classification of Natural Pigments based on structural unit. 4
(ii) Give synthesis of Querecetin. 3

OR

- (i) What is anthocyanin, anthocyanidin and Flavone. Give general method for the synthesis of anthocyanidin. 4
(ii) Give properties of flavones. What happens when flavone is fused with KOH and boiled with KOH? 3
(B) (i) Differentiate Haem & Haemin. Discuss the reductive degradation of Haemin with tin & HCl. 4
(ii) Give synthesis of phyllo payroll carboxylic acid. 3

OR

- (i) Discuss geometry and aromatic character of porphin. Give one synthesis of dipyrromethene. 4
(ii) Discuss acidic and basic hydrolysis of Chlorophyll. 3

2 Answer the following :

- (A) (i) Prove the structure of Meroquinine with synthesis. 4
(ii) Give evidence for the presence of sulphour atom in five member ring in Biotin. 3

OR

- (i) Discuss nature of nucleus and position of methoxy and carboxyl group in Reserpine acid. 4
(ii) Discuss the structure of Thiazole part of Vitamin B₁. 3

(B) (i) Give evidence for the presence of acetamido group and nature of ring C in Colchicine. 4

(ii) Give synthesis of Vitamin-C. 3

OR

(i) Give evidence for the nature and position of side chain in α -Tocopherol. 4

(ii) Discuss the nature of hydroxyl group in morphine. Convert morphine to morphenol and derive conclusion. 3

3 Answer the following :

(A) (i) Give evidence for the nature and position of side chain in Ergosterol. 4

(ii) Discuss the nature and position of side chain in Cholesterol. 3

OR

(i) Give evidence for the size of ring A, B, and D in Cholesterol. 4

(ii) Explain transformation of $R - CH_2 - COOH \rightarrow R - COOH$. Name it and show how it is important to establish the nature of side chain in cholesterol. 3

(B) (i) What are Sex hormones ? Classify them giving one example of each. Give synthesis of Testosterone. 4

(ii) Explain the pathway by which Squalene is converted to cholesterol in animal. 3

OR

(i) Explain the chemical relationship and their inter conversion among oestrone, oestriol and oestradiol. 4

(ii) What are corticoids ? Give partial synthesis of Cortisone. 3

4 Answer the following :

(A) (i) Give evidence for the position of angular methyl group in abietic acid: 4

(ii) Give synthesis of Farnesol. 3

OR

(i) Give degradation product of Gibberic acid and derive conclusion. 4

(ii) Give synthesis of Zingiberine. 3

- (B) (i) Discuss the structure of Farnesol. 4
(ii) Prove the structure of allo giberic acid 3
analytically.

OR

- (i) Discuss the structure of Zingiberine. 4
(ii) Give synthesis of retene. 3

5 Answer the following : (short questions) : 14

- (1) Give name and structure of one pyrrane and pyrrone pigments.
- (2) Which disease is shown in deficiency of Vitamin-H ?
- (3) The haemoglobin consists of two parts ? Mention their name.
- (4) What is meant by soret band in porphyrin ?
- (5) How will you prove the 2° and 3° nitrogen present in alkaloids ?
- (6) Give structure of Reserpine.
- (7) Define Natural product.
- (8) What is Blank's rule?
- (9) Give structure of Diels hydrocarbon, chrysene and picene.
- (10) Give structure formula of cortisol.
- (11) Give reaction of weerman test.
- (12) Define Isoprene rule with example.
- (13) How will you detect double bond in terpenoids?
- (14) Discuss relationship between morphine, codeine and thebaine.



H-143002

Seat No. _____

M. Sc. (Sem. III) Examination
November - 2019
MSC0C302 : Organic Chemistry
(Medicinal Chemistry)

Time : 3 Hours]

[Total Marks : 70

Instruction: Figures to right indicate full marks

- 1 (A) Answer the following (07)**
(1) Define antibiotics, classify antibiotics depending upon the source from which they are derived.
OR
(1) Discuss SAR of Chloramphenicol.
- (B) Answer the following (07)**
(1) Give brief account of third generation Cephalosporin.
OR
(1) Give synthesis and use of Penicillin V and Ampicilline.
- 2 (A) Answer the following (07)**
(1) What is general anesthetics? Give structural variations in general anesthetics.
(2) Give synthesis and use of Alprazolam.
OR
(1) What are antidepressants? Classify them giving one example of each class.
(2) Give synthesis and use of Theopental
- (B) Answer the following (07)**
Give following synthesis and use. (Any three)
(1) Amobarbital (2) Diazepam (3) Chlorzepam (4) Ibuprofin (5) Procaine
- 3 (A) Answer the following (07)**
(1) Explain chemotherapy of malaria. Give brief account of 4-amino quinoline.
(2) Give synthesis and use of mefloquines.
OR
(1) Give synthesis and use of Chloroquine and Daraprim
- (B) Answer the following (any three) (07)**
Give synthesis and use of (i) Isoniazid (2) Ethionamide (3) DDS (Dapsone)
(4) Ethambutol

- 4 (A) Answer the following** (07)
- (1) What are diuretics? Classify them according to their therapeutic use with one example of each class.
 - (2) Give synthesis and use of Chlorothiazide

OR

- (1) What are cardiovascular drugs? Give a brief account on classification cardiovascular drug.
- (2) Give synthesis and use of Acetazolamide.

- (B) Answer the following (any three)** (07)
- Give synthesis and use of (1) Atenolol (2) Tolbutamide (3) Methyl dopa
(4) Furosemic (5) Ethacrynic acid

- 5 Answer the following questions.** (14)
- (i) Give one name, structure and use of non-lactum antibiotics.
 - (ii) Give structure and use of tetracycline.
 - (iii) What is local anesthetist?
 - (iv) Give name, structure of any two local anesthetics.
 - (v) Define hypnotics drugs?
 - (vi) Give structure and use of nikethamide.
 - (vii) Define role of insulin.
 - (viii) Define Beta blockers.
 - (ix) Name the infection caused by mycobacteria.
 - (x) Define hypoglycemic condition.
Give structure and use of
 - (xi) Dibucaine
 - (xii) Novalgine
 - (xiii) Primaquine
 - (xiv) Cycloserin



H-143003

Seat No. _____

M. Sc. (Sem. III) Examination

November - 2019

MSC0C303 : Spectroscopy

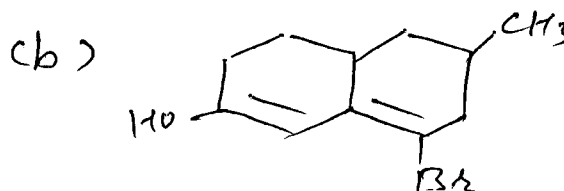
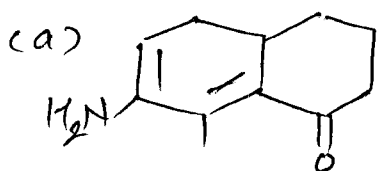
Time : 3 Hours]

[Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) Figures to the right indicate full marks.

- 1 (a) (1) Explain the effect of conjugation on UV spectra. 3
(2) Calculate the λ_{\max} values for the following 4
compounds.



OR

- Explain different types of shifts in UV spectra. 7
(b) (1) Explain : Fermi Resonance, Overtones. 4
(2) How can you distinguish acetanilide and acetophenone by IR spectra ? 3

OR

- (1) Write a short note on various applications of IR spectroscopy. 4
(2) Discuss the effect of H-bonding of IR spectra. 3
(b) Discuss spin-spin coupling of $\text{CH}_3\text{-CH}_2$. 7

OR

- (1) Write a short note on spin decoupling. 4
(2) How can you distinguish ethyl benzene and toluene by NMR spectra ? 3

- 3 (a) (1) Discuss isotope abundance with suitable example. 4
(2) Write a short note on ^{13}C -NMR applications.

OR

- (a) (1) Explain DEPT spectrum in ^{13}C -NMR. 4
(2) How many signals you will get in ^1H -NMR and ^{13}C -NMR of $\text{CH}_3 - \text{CCl}_3$? 3
- (b) (1) Explain : Relative Abundance, Metastable ion. 4
(2) Give names of various hyphenated techniques of mass spectroscopy. 3

OR

- (b) (1) Explain factors controlling fragmentations. 4
(2) Explain principle of mass spectroscopy. 3

- 4 (a) An organic compound having MF $\text{C}_8\text{H}_{14}\text{O}_4$ exhibits the following spectral data. 7

UV : Transparent

IR : 2872, 1705 (s), 1322, 1150, 1058(s) cm^{-1} .

^1H NMR : 1.2 (t, 6H), 2.7 (s, 4H), 3.8 (2, 4H)

^{13}C NMR: 21.2(q) 30.3 (t), 52.1(t), 172 (s)

HRMS : 174.123

Deduce the structure with suitable explanation.

OR

An organic compound with MF $\text{C}_8\text{H}_7\text{N}$ exhibits following spectral data.

UV : λ_{max} 272 nm

IR : 3034, 2910, 2210(s), 817(s) cm^{-1} .

^1H NMR : δ 2.32(s, 3H), 6.7 (d, 2H) 6.9 (d, 2H)

^{13}C NMR : δ 21.5(q), 119.1(s), 125.2(s), 128.1(d), 130.9(d), 138.2(s).

Deduce the structure with suitable explanation.

(b) An organic compound having MF C_6H_{12} exhibits the following spectral data. 7

UV : No strong band.

IR : 3030, 2856, 970(s) cm^{-1} .

1H NMR : δ 1.2(t, 6H), 2.3 (m, 4H) 4.8 (t, 2H)

^{13}C NMR : δ 29.5(q), 32.5(t), 128.9(d)

Deduce the structure with suitable explanation.

An organic compound with a MF C_9H_{12} exhibits the following spectral data :

UV : λ_{max} 262 nm

IR : 3067, 2907, 1608, 1473, 885(s) cm^{-1} .

1H NMR : δ 2.26(S, 9H), 6.8 (S, 3H)

^{13}C NMR : δ 21.9, 127.9, 138.2

HRMS : 120.1289

Deduce the structure with suitable explanation.

5 Answer the following in brief : 14

- (1) Which type of lamps can be used in UV spectra ?
- (2) What is the normal range of UV spectrum ?
- (3) Which shows higher among anthracene and naphthalene ?
- (4) What is Nerst filament and a Globar in IR spectra ?
- (5) Why samples of IR spectra must be totally dry ?
- (6) What is the combination band in IR spectra ?
- (7) Name two mulling agents used in IR spectra.
- (8) How 2D correlation spectra can be useful ?
- (9) What is the impact of ^{19}F in 1H NMR spectra ?
- (10) What is the relation between δ and δ in 1HNMR ?
- (11) How many signals p-xylene gives in 1H NMR spectra ?
- (12) What is frequency domain spectrum ?
- (13) How much intensity base peak has ?
- (14) The mass spectrum is a plot of what ?

SELECTED SPECTRAL DATA

Characteristic Infrared Absorption Frequencies


Bond Type	Stretching, cm ⁻¹	Bending, cm ⁻¹
C-H alkanes	2960-2850 (s)	1470-1350 (s)
C-H alkenes	3080-3020 (m)	1000-675 (s)
C-H aromatic	3100-3000 (v)	870-675 (y)
C-H aldehyde	2900, 2700 (m, 2 bands)	
C-H alkyne	3300(s)	
C≡C alkynes	2260-2100 (v)	
C=N nitrite	2260-2220 (v)	
C=C alkenes	1680-1620 (v)	
C=C aromatic	1600-1450 (v)	
C=O ketone	1725-1705 (s)	
C=O aldehyde	1740-1720 (s)	
C=O α,β-unsaturated ketone	1685-1665 (s)	
C=O aryl ketone	1700-1680 (s)	
C=O ester	1750-1735 (s)	
C=O acid	1725-1700 (s)	
C=O amide	1690-1650 (s)	
O-H alcohols (not hydrogen bonded)	3650-3590 (v)	
O-H alcohols (hydrogen bonded)	3600-3200 (s, broad)	1620-1590 (v)
O-H acids	3000-2500 (s, broad)	1655-1510 (s)
N-H amines	3500-3300 (m)	
N-H amides	3500-3350 (m)	
C-O alcohols, ethers, esters	1300-1000 (s)	
C-N amines, alkyl	1220-1020 (w)	
C-N amines, aromatic	1360-1250 (s)	
NO ₂ nitro	1560-1515 (s)	
	1385-1345 (s)	

s = strong absorption
m = medium absorption
w = weak absorption
v = variable absorption

Typical chemical shifts for Types of Hydrogen Atoms,
Seen in Proton Magnetic Resonance Spectra

Type of Hydrogen Atom	δ*	Type of Hydrogen Atom	δ*
RCH ₃	0.9	R ₂ C=CH ₂	5.0
RCH ₂ R acyclic	1.3	RCH=CR ₂	5.3
acyclic	1.5	ArH	7.3
R ₃ CH	1.5-2.0	O RCH	9.7
R ₂ C=C CH ₃ R'	1.8	RNH ₂	1-3
O R ₂ CCH ₃	2.0-2.3	ArNH ₂	3-5
ArCH ₃	2.3	O RCNHR	5-9
RC≡CH	2.5	ROH	1-5
RNHCH ₃	2-3	ArOH	4-7
RCH ₂ X (X = Cl, Br, I)	3.5	O RCOH	10-13
O ROCH ₃ , RCOCH ₃	3.8		

COMMON FRAGMENTS LOST

Molecular Ion	Fragment Lost Inference structure
1	H·
2	2H·
15	CH ₃ ·
16	O (ArNO ₂ , amine oxides, sulfoxides); ·NH ₂ (carboxamides, sulfonamides)
17	HO·
18	H ₂ O (alcohols, aldehydes, ketones)
19	F·
20	HF
26	CH = CH·, ·CH = N
27	CH ₂ = CH·, HC = N (aromatic, nitrites, nitrogen heterocycles)
28	CH ₂ = CH ₂ ·, CO, (quinones) (HCN+H)
29	CH ₃ CH ₂ ·; (ethyl ketones, ArCH ₂ CH ₂ CH ₂ ·), ·CHO
30	NH ₂ CH ₂ ·, CH ₂ O (ArOCH ₂), NO (ArNO ₂), C ₂ H ₅
31	·OCH ₃ (methyl esters), ·CH ₂ OH, CH ₃ NH ₂
32	CH ₃ , OH, S
33	HS· (thiols), (·CH ₃ and H ₂ O)
34	H ₂ S (thiols)
35	CF
36	HCl, 2H ₂ O
37	H ₂ CF (or HCl + H)
38	C ₂ H ₂ , C ₂ N, F ₂
39	C ₂ H ₃ , HC ₂ N
40	CH ₂ C = CH
41	CH ₂ = CHCH ₂ ·
42	CH ₂ = CHCH ₂ ·, CH ₂ = C = O, H ₂ C  CH ₂ , NCO, NCNH ₂
43	C ₂ H ₅ · (propyl ketones, ArCH ₂ -C ₂ H ₅), CH ₃ C(=O)· (methyl ketones, CH ₃ CG, where G = various functional groups), CH ₂ = CH-O· (CH ₃ · and CH ₂ = CH ₂), HCNO
44	CH ₂ = CHO, CO ₂ (esters, anhydrides) N ₂ O, CONH ₂ , NHCH ₂ CH ₂
45	CH ₂ CHOH, CH ₂ CH ₂ O (ethyl esters), CO ₂ H, CH ₂ CH ₂ NH ₂
46	(H ₂ O and CH ₂ = CH ₂), CH ₂ (H ₂ O), ·NO, (ArNO ₂)
47	CH ₃ S·
48	CH ₃ SH, SO (sulfoxides), O ₂
49	·CH ₂ Cl
51	·CHF ₂

- 52 C_2H_2, C_2N_2
 53 C_2H_4
 54 $CH_2=CH-CH=CH_2$
 55 $CH_2=CHCHCH_2$
 56 $CH_2=CHCH_2CH_2, CH_3CH=CHCH_2, 2CO$
 57 C_4H_8 (butyl ketones), C_2H_5CO (ethyl ketones, $EtC=OG$, G = various structural units)
 58 $NCS, (NO + CO), CH_3COCH_3, C_2H_6$

Chemical Shifts for Carbon Atoms in Carbon-13 Nuclear Magnetic Resonance Spectra

Type of Carbon Atom	δ^*	Type of Carbon Atom	δ^*
RCH_2CH_3	13-16	$RCH=CH_2$	115-120
RCH_2CH_2	16-25	$RCH=CH$	125-140
R_2CH	25-38	$RC \equiv N$	117-125
$\begin{array}{c} O \\ \\ CH_2CR \end{array}$	-30	AlH	125-150
$\begin{array}{c} O \\ \\ CH_2COR \end{array}$	-20	$\begin{array}{c} O \\ \\ RCOR' \end{array}$	170-175
RCH_2Cl	40-45	$\begin{array}{c} O \\ \\ RCOH \end{array}$	177-185
RCH_2Br	28-35	$\begin{array}{c} O \\ \\ RCH \end{array}$	190-200
RCH_2NH_2	37-45	$\begin{array}{c} O \\ \\ RCR' \end{array}$	205-220
RCH_2OH	50-64		
$RC \equiv CH$	67-70		
$RC \equiv CH$	74-85		



H-143004

Seat No. _____

M. Sc. (Sem. III) Examination

November - 2019

MSC0C304 : Industrial Chemistry

Time : 3 Hours]

[Total Marks : 70

Instructions : (1) All questions are compulsory.
(2) Figures to the right indicate total marks of the question.

1 (a) Write a note on Batch Operation and Continuous Operation with its importance. 7

OR

(a) Discuss the flow chart and its importance in chemical industry.

(b) What is "patent"? Discuss the importance of patents in R & D. 7

OR

(b) What is "GLP" ? Give a brief note on it.

2 (a) Discuss the sulfonation reaction and its industrial applications. 7

OR

(a) Write a brief note on halogenation and its importance in chemical industry.

(b) Discuss amination by ammonolysis and reduction. 7

OR

(b) Discuss the sulphonation of benzene and naphthalene.

3 (a) Discuss the 12 Principles of Green Chemistry. 7

OR

(a) Discuss Wurtz and Witting Homer reaction on the basis of green chemistry.

(b) Write a note on O-alkylation and N-alkylation. 7

OR

(b) Discuss ionic liquid as green solvent in green chemistry.

- 4 (a) What is agrochemicals ? Discuss manufacture and uses of insecticides and fungicides. 7

OR

- (a) Write a note on weedicides and pesticides.
- (b) Write a note on plant nutrients and plant hormones. 7

OR

- (b) Discuss various type of filtration.

- 5 Answer the following questions : 14

- (1) What is R & D ?
 - (2) Define GLP and GMP.
 - (3) Give the reaction of nitration.
 - (4) Define alkylation.
 - (5) Define amination.
 - (6) Give reaction of N-alkylation.
 - (7) Give reaction for Michael reaction.
 - (8) Define Green Chemistry.
 - (9) Give names of two green catalyts.
 - (10) What are the differences between unit operation and unit process?
 - (11) What is unit process?
 - (12) What is pesticides ?
 - (13) What is weedicide?
 - (14) What is agrochemicals?
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