# TEST SERIES GATE 2019

## BOOKLET SERIES B

## ORGANIC CHEMISTRY

**Paper Code: CY**

**Test Type: TEST SERIES**

**Duration: 2:30 Hours**

# CHEMISTRY-CY

**Date: 13-01-2019**

**Maximum Marks: 100**

**Read the following instructions carefully:**

1. Attempt all questions.
2. This question paper consists of **2 sections**, General Aptitude (GA) for **15 marks** and the subject specific GATE paper for **85 marks**. Both these sections are compulsory. The GA section consists of **10** questions. Question numbers 1 to 5 are of 1-mark each, while question numbers 6 to 10 are of 2-mark each.
   The subject specific GATE paper section consists of **55** questions, out of which question numbers 11 to 35 are of 1-mark each, while question numbers 36 to 65 are of 2-mark each.
3. The question paper may consist of questions of **multiple choice type** (MCQ) and **numerical answer type**.
4. Multiple choice type questions will have four choices against (a), (b), (c), (d), out of which only **ONE** is the correct answer.
5. For numerical answer type questions, each question will have a numerical answer and there will not be any choices.
6. All questions that are not attempted will result in zero marks. However, wrong answers for multiple choice type questions (MCQ) will result in **NEGATIVE** marks. For all MCQ questions a wrong answer will result in deduction of ⅓ marks for a **1-mark** question and ⅔ marks for a **2-mark** question.
7. There is **NO NEGATIVE MARKING** for questions of **NUMERICAL ANSWER TYPE**.
8. Non-programmable type Calculator is allowed



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**Q.1-Q. 5 carry ONE mark each.**

1. In the following question, out of the four alternatives, select the alternative which best expresses the meaning of the idiom/phrase.
**To kick the habit**
(a) To start a healthy practice (b) To make a habit of hurting other's feelings
(c) To overcome an addiction (d) To have the habit of overcoming obstructions.

2. In the following question, out of the four alternatives, select the alternative which best expresses the meaning of the idiom/phrase.
**To zip it**
(a) To move along very fast (b) Send a parcel by post
(c) A rude way of telling someone to stop talking (d) To put something precious in a safe place

3. What should be the minimum height of water in a cylindrical glass to completely submerge a spherical iron ball of radius 6m ? (Provided the ball fits completely in the glass, i.e., difference between the radius of the sphere and the cylinder in negligible).
(a) 9 m (b) 4 m (c) 8 m (d) 7 m

4. Given below are two statements followed by two conclusions. Assuming the statements to the true, decide which one logically follows.
STATEMENTS : CONCLUSIONS:
**I.** All A are B **1.** Some B are C
**II.** Some A are C **2.** Some B are A
(a) Only I follows (b) Only II follows
(c) Neither 1 nor 2 follows (d) Both 1 and 2 follows

5. Four students A, B, C, D of read in four different classes from class (v) to class (viii) and wears uniform of four different colours i.e., red, white, blue, yellow. The one who wears white shirt reads in class (vi). B wears red shirt and does not read in class (vii) or class (viii). C does not wear yellow colour shirt and D does not read in class (viii). Based on the information provided find out who reads in class (vi).
(a) B (b) A (c) D (d) C

**Q.6-Q. 10 carry TWO marks each.**

6. A sentence has been given with a blank to be filled with an appropriate word. Choose the correct alternative.
They were _____ because all their plans had gone away.
(a) Defeated (b) Rejected (c) Elated (d) Distraught

7. A sentence has been given with a blank to be filled with an appropriate word. Choose the correct alternative.
This brings nothing else _____ joy to us.
(a) than (b) from (c) but (d) to

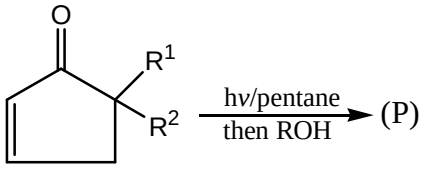
8. A person can complete a job in 120 days. On day 1 he starts the work alone. On day 2, he is assisted by another person who also completes the job in 120 days. On day 3, they are joined by another person who also completes the work in 120 days like this, everyday a new person with the same efficiency joins the work. In how many days the job will be completed
(a) 20 (b) 30 (c) 10 (d) 15

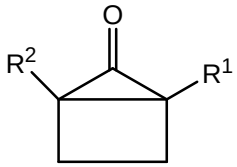
9. Six friends P, Q, R, S, T, U are sitting in a row facing the East. R is between P and T. Q is just to the right of T, but to the left of S. U is not at the right end. Who is at the extreme right end ?
(a) P (b) R (c) Q (d) S

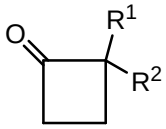
10. Find out what should come in place of question mark (?) ?
3, 7,23, ? 479
(a) 63 (b) 95 (c) 120 (d) 98

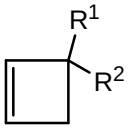
**Q.11-Q.35 carry one mark each.**

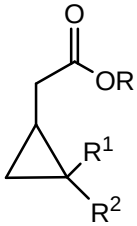
11. The major product (P) is

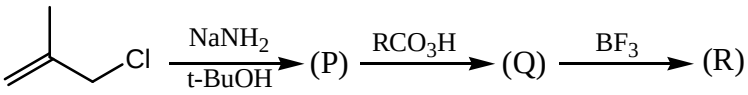



(a) 


(b) 

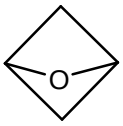

(c) 

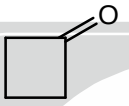

(d) 

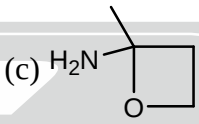

12. 

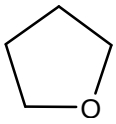

Identify the compound (R) produced in the above reaction sequence
Data for compound (R),

$\delta_H\,(ppm) = 3.02(4H, d, J = 5\,Hz); 1.00(2H, \text{quintet}, J = 5Hz)$

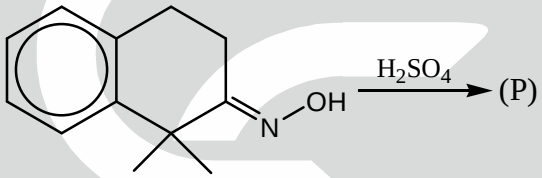
(a) 

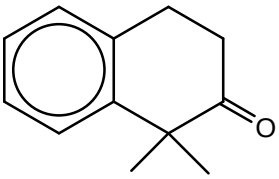

(b) 

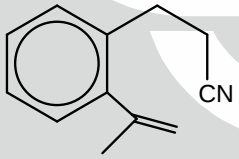

(c) 

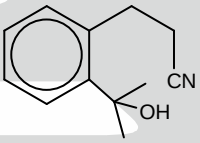

(d) 

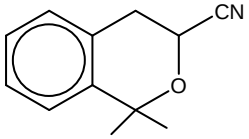

13. The major product (P) is



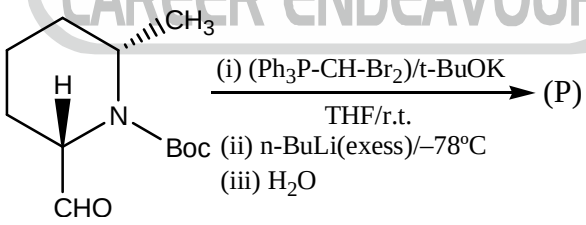

(a) 


(b) 

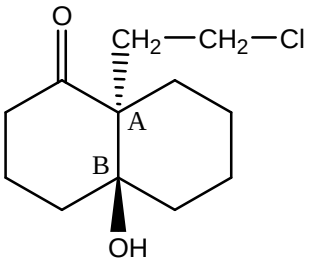

(c) 


(d) 


14. In the follwoing reaction sequence, how many pi-bonds will be present in the product (P):

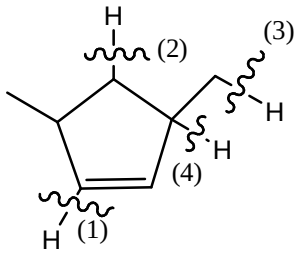



15. Absolute R/S configuration at the centre A and B, are respectively



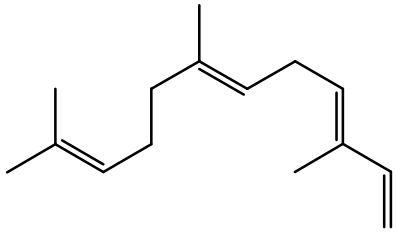

(a) R, R (b) S, S (c) R, S (d) S, R

16. The C–H bond with least amount of bond dissociation energy for homolytical cleavage among the following marked bonds is



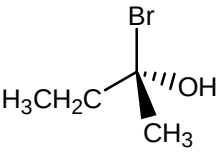

(a) 1 (b) 2 (c) 3 (d) 4

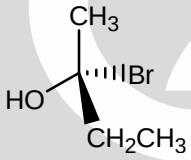
17. $\alpha$-Farnesene shown below is a



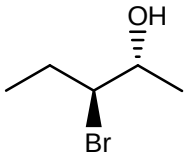
(a) Diterpene having two isoprene units (b) Triterpene having three isoprene units
(c) Triterpene having four isoprene units (d) Sesquiterpene having three isoprene units

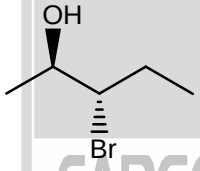
18. Which of the following statement is *incorrect*.

(a) 

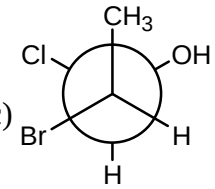
and 

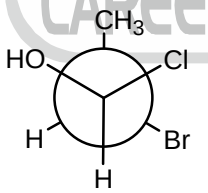
are enantiomer

(b) 

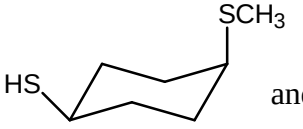
and 

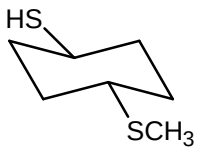
are diastereoisomer

(c) 

and 

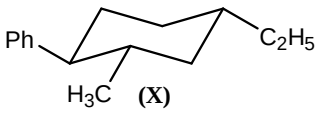
are homomer

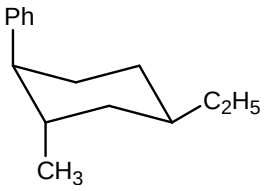
(d) 

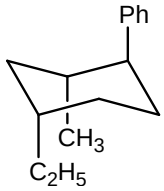
and 

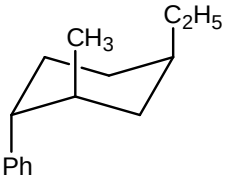
are diastereoisomer

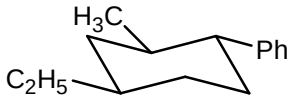
19. The correct structure of flipping of the given compound (X) is



(a) 

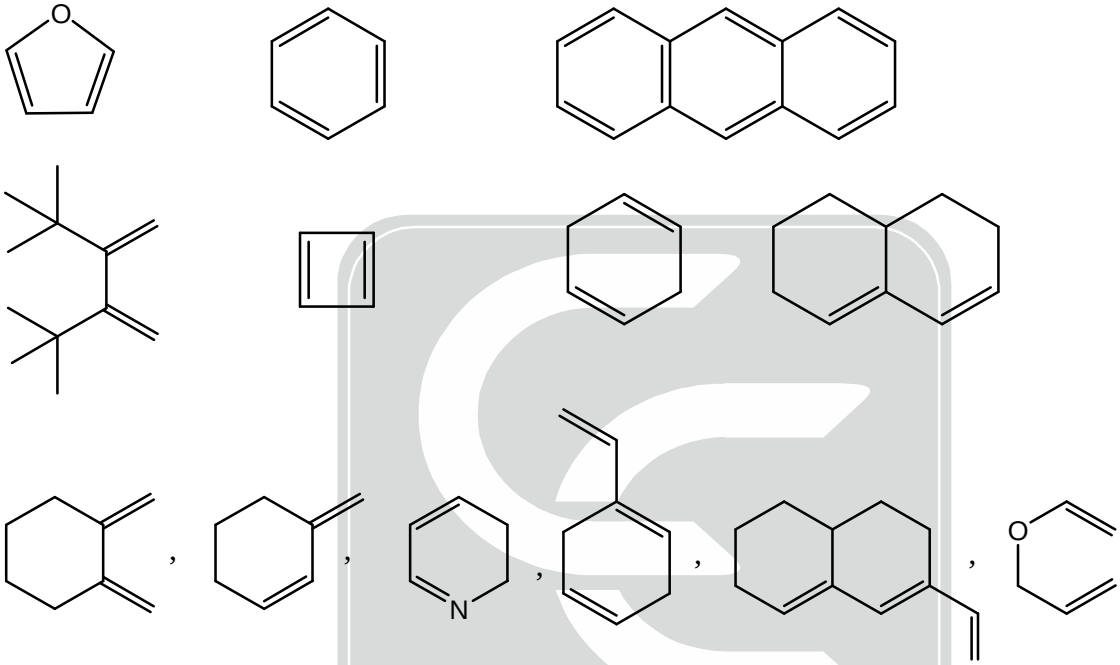

(b) 


(c) 

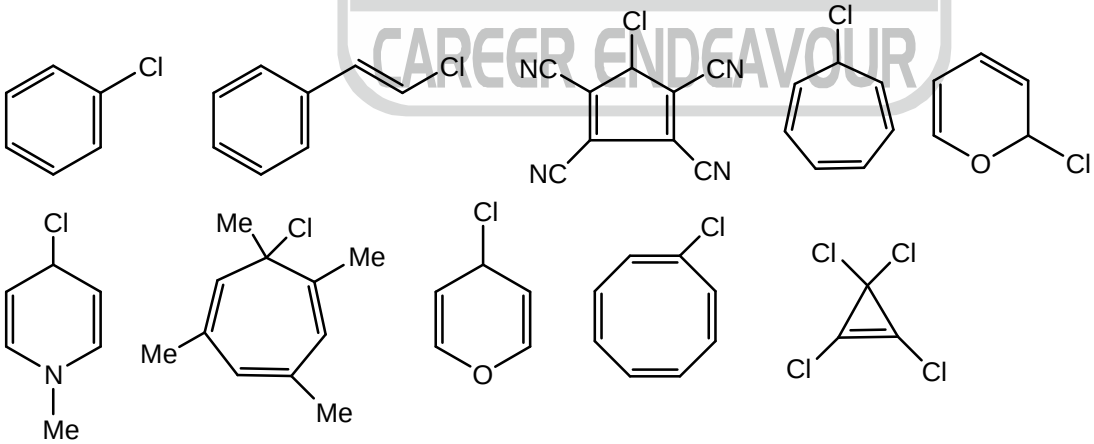

(d) 


20. Treatment of the hexapeptide Ala-Vla-Phe-Lys-Asp-Ala in separate experiments with the enzyms amino peptidase, chymotrypsin and pepsin respectively, gives
(a) Ala + Val-Phe-Lys-Asp-Ala; Ala-Val-Phe + Lys-Asp-Ala; Ala-Val-Phe-Lys + Asp-Ala
(b) Ala + Val-Phe-Lys-Asp-Ala; Ala-Val + Phe-Lys-Asp-Ala; Ala-Val-Phe-Lys + Asp-Ala
(c) Ala + Val-Phe-Lys-Asp-Ala; Ala-Val-Phe + Lys-Asp-Ala; Ala-Val-Phe-Lys-Asp + Ala
(d) Ala-Val-Phe-Lys-Asp + Ala; Ala-Val + Phe-Lys-Asp-Ala; Ala-Val-Phe-Lys + Asp-Ala

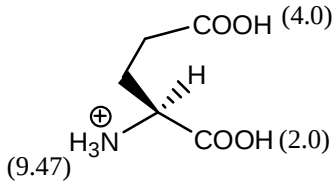
21. Among the following, the number of compounds which can participates as 'Diene' component in a Diels-Alder reaction is




22. The total number of compounds that give precipitate readily on reaction wtih $AgClO_4$ is _____



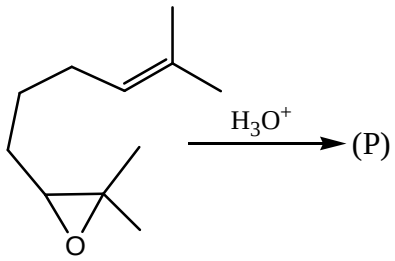

23. The isoelectric point of the given compound will be

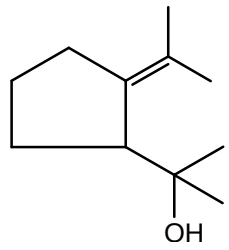


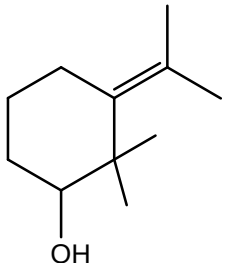

(9.47)

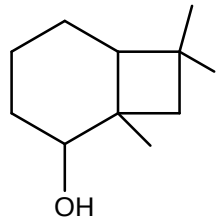
(corresponding $pK_a$ values are mentioned in bracket). (Upto one decimal place).

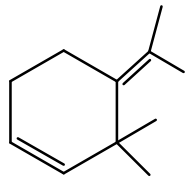
24. The major product (P) formed in the following reaction,



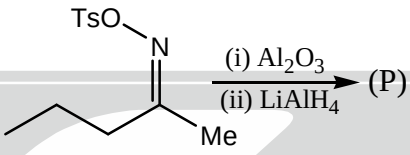

(a) 

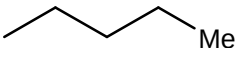

(b) 

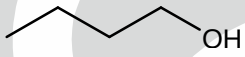

(c) 

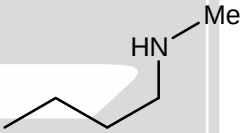

(d) 

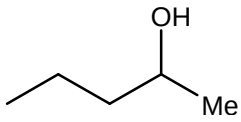
25. The major product (P) is,



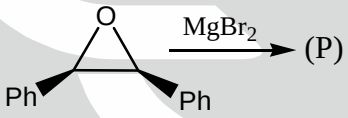

(a) 

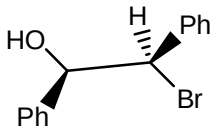

(b) 

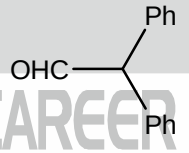

(c) 

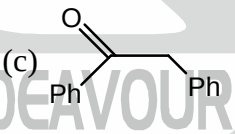

(d) 

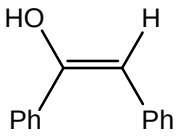

26. The major product (P) formed in the following reaction



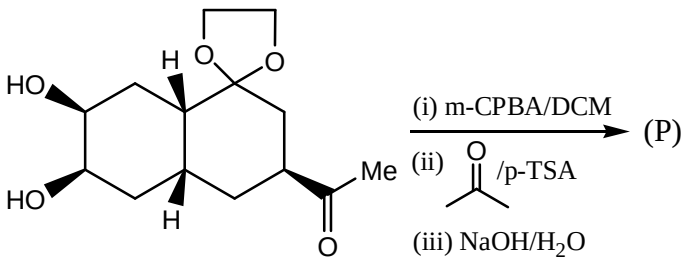

(a) 

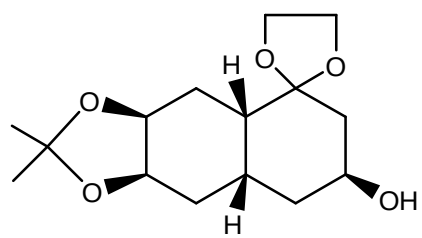

(b) 

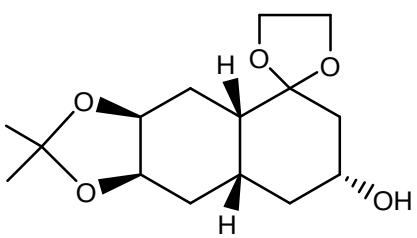

(c) 

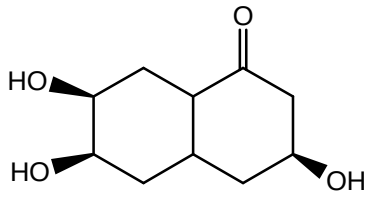

(d) 

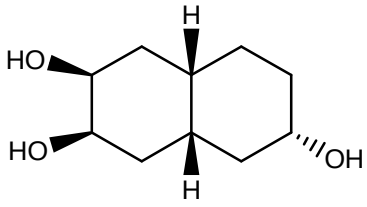

27. The major product (P) is,



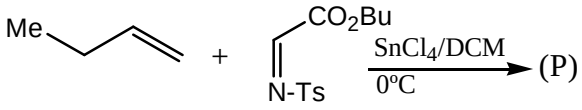

(a) 

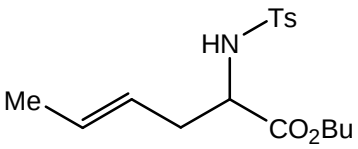

(b) 

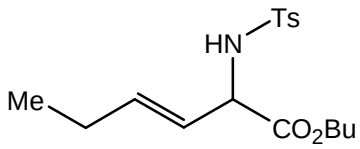
(c) 

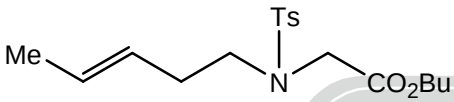
(d) 

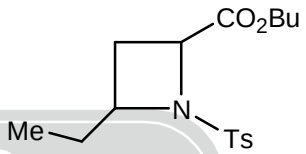
28. The major product (P) is



(a) 

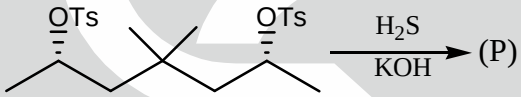
(b) 

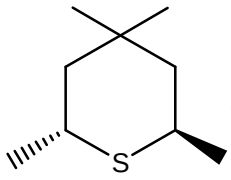
(c) 

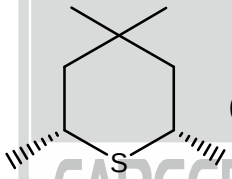
(d) 

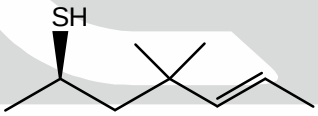
29. The reaction between terminal alkyne and alkyl azide in presence of $CuSO_4$ (10 mol%) and sodium ascorbate gives product (P). In the product (P) the number of nitrogen atoms present is/are _____

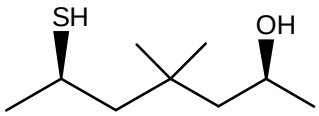
30. The major product (P) formed in the following reaction,



(a) 

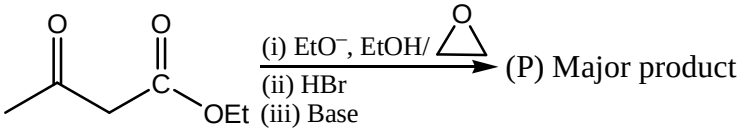
(b) 

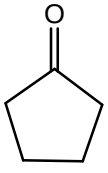
(c) 

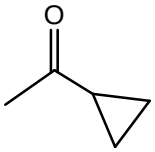
(d) 

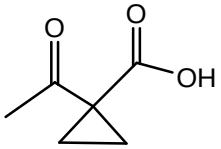


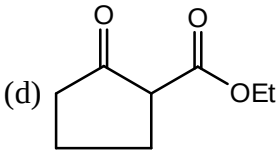
31. The major product (P) is



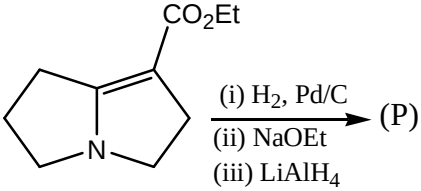
(a) 

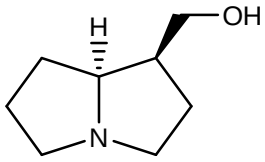
(b) 

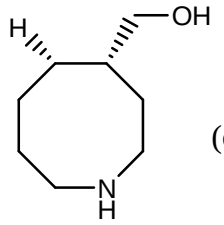
(c) 

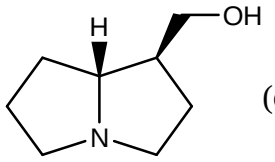
(d) 

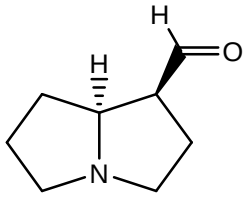
32. The major product (P) formed in the following reaction sequence is



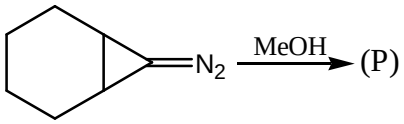
(a) 

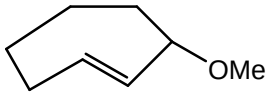

(b) 

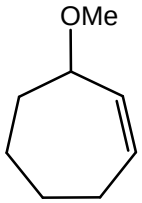

(c) 

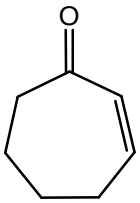

(d) 

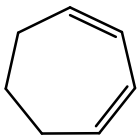

33. The major product (P) formed in the following reaction,



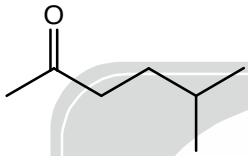

(a) 


(b) 


(c) 


(d) 

34. The m/z value of the detectable fragment formed by McLafferty like rearrangement of the following compound in mass spectrometer is _____



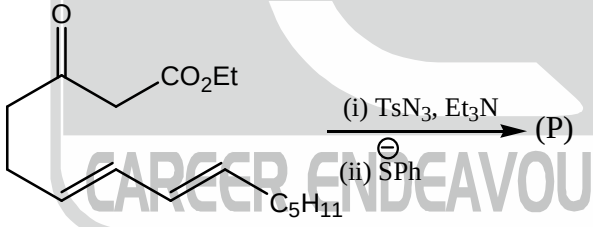

35. The correct order of carbonyl stretching frequencies in the IR-spectrum of following compounds (I-III), is

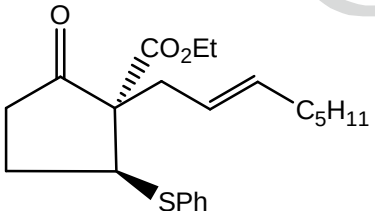
(I) Ethylbutyrate (II) Vinyl acetate (III) Methyl benzoate

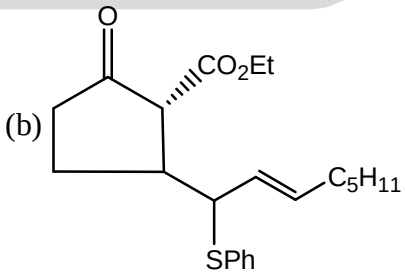
(a) I > II > III (b) III > II > I (c) II > I > III (d) II > III > I

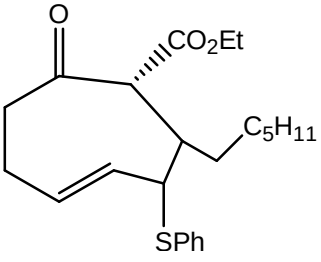
**Q.36-Q.65 carry TWO marks each.**

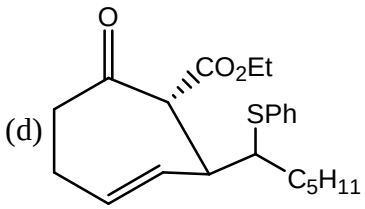
36. The major product (P) formed in the following reaction sequence




(a) 

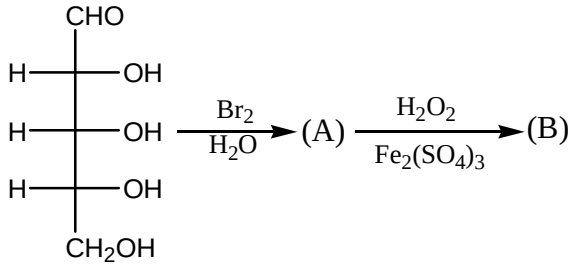

(b) 


(c) 


(d) 

37. A solution of 2.0 g of (+)–glyceraldehyde in 10.0 ml of water was placed in a 10 cm polarimeter tube. Using the sodium D line, a rotation of +1.47º was observed at 25ºC. The specific rotation of (+)–glyceraldehyde is _____(upto one decimal place).

38. Consider the following reaction,

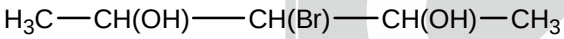



Total number of secondary –OH groups in product (B) is/are _____

39. Calculate $[\alpha]_D$ of a 1M solution of 2-chloropentane in a 10 cm cell, when the observed rotation is +3.64º. (Rounded up to one decimal places).

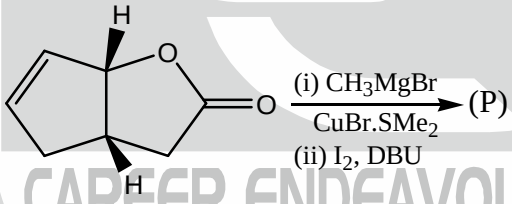
40. Addition of $Br_2$ to (Z)-2-butene gives
(a) (2R, 3R) dibromobutane through achiral brominium ion
(b) (2S, 3S) dibromobutane through achiral brominium ion
(c) Mixture of (2R, 3R) and (2S, 3S) dibromobutane through chiral brominium ion.
(d) Mixture of (2R, 3R) and (2S, 3S) dibromobutane through achiral brominium ion.

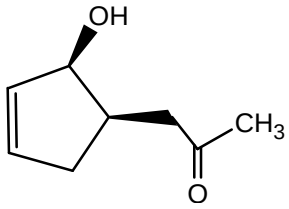
41. The number of optically active stereoiosmers possible for the following compound is

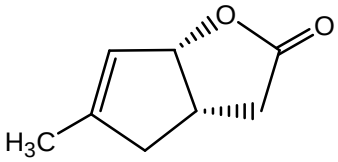


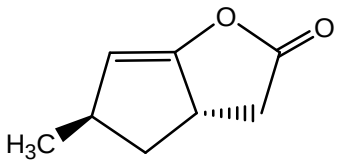

(X)

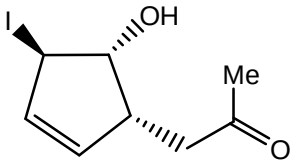
42. The major product (P) formed in the following reaction sequence.



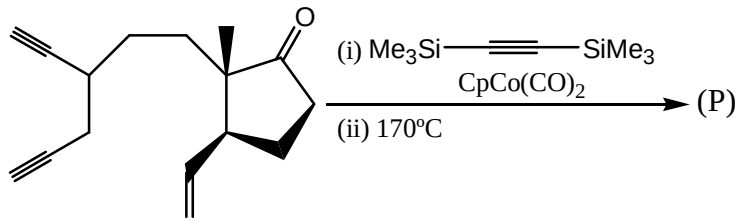

(a) 


(b) 

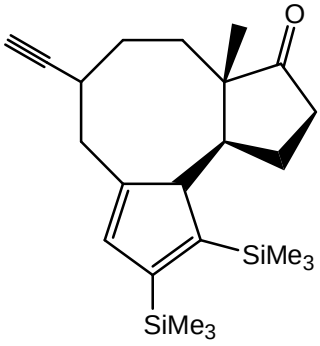

(c) 


(d) 

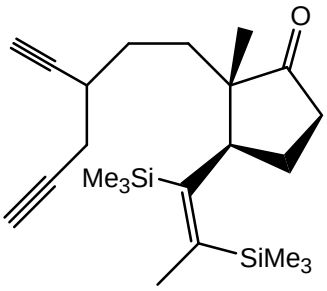
43. The major product (P) formed in the following reaction,



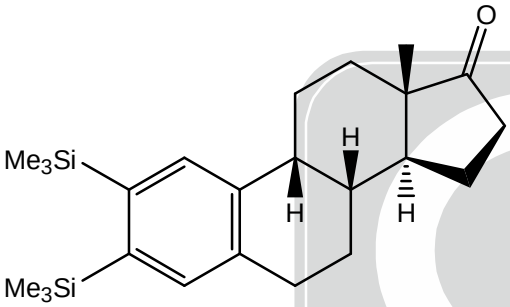

(a)



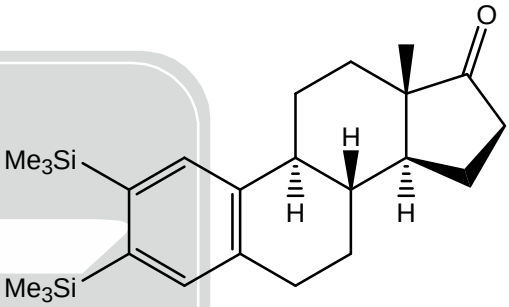

(b)



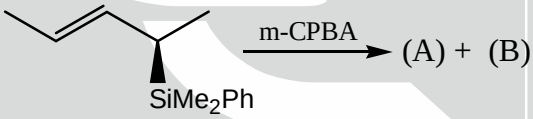

(c)



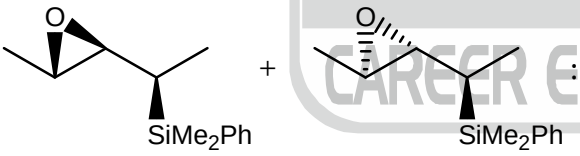

(d)




44. The correct major (A) + minor (B) products with their relationship formed (respectively) in the following reaction

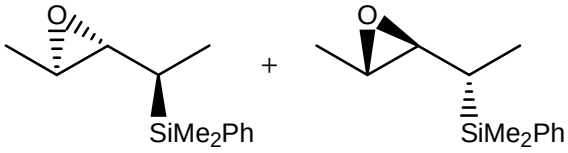



(a)



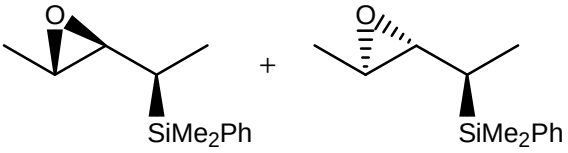

: Enantiomers

(b)



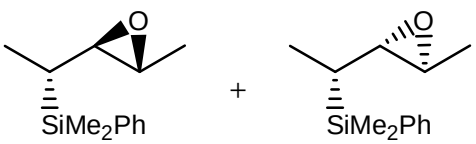

: Enantiomers

(c)



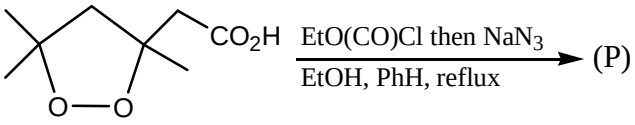

: Diastereoisomers

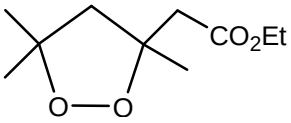
(d)

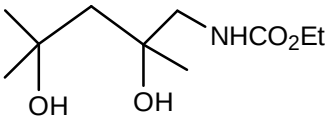


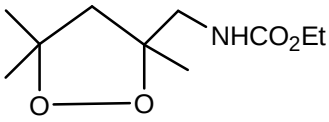

: Diastereoisomers

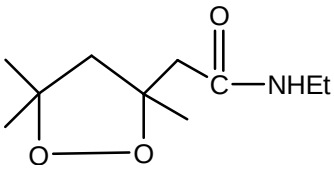
45. The major product (P) is,



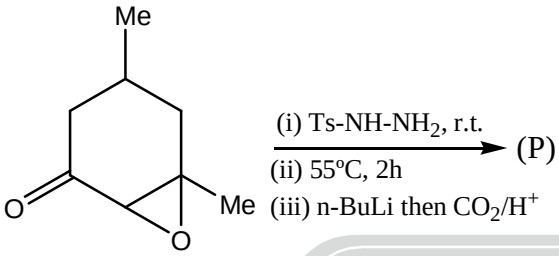

(a) 

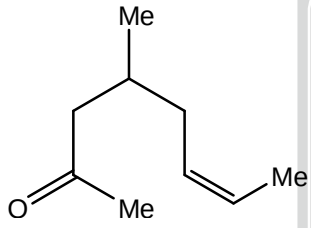

(b) 

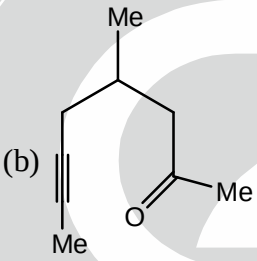

(c) 

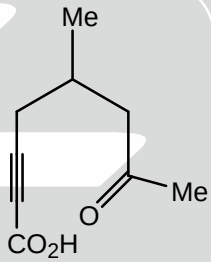

(d) 

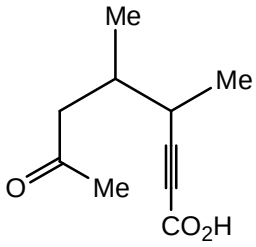

46. The major product (P) is



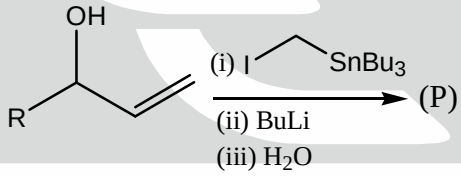

(a) 

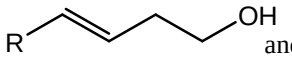

(b) 


(c) 

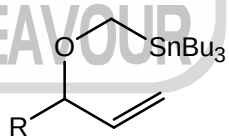

(d) 


47. The major product (P) and the rearrangement involved in the following reaction sequence is

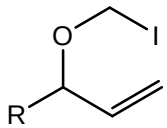



(a) 

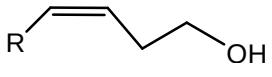
and [2, 3] S.T.R.

(b) 

and [1, 3] S.T.R.

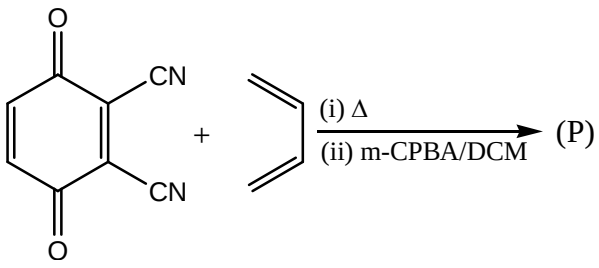
(c) 

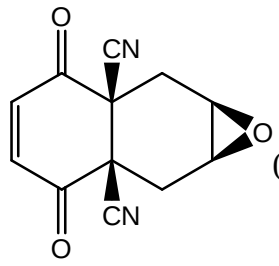
and [1, 3] S.T.R.

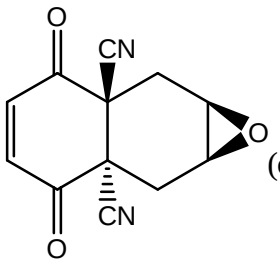
(d) 

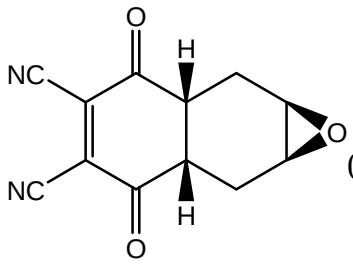
and [2, 3] S.T.R.

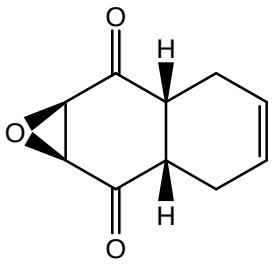
48. The major product (P) is



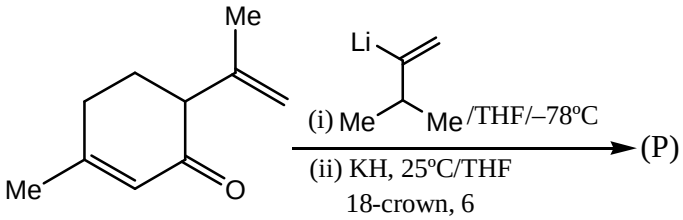
(a) 

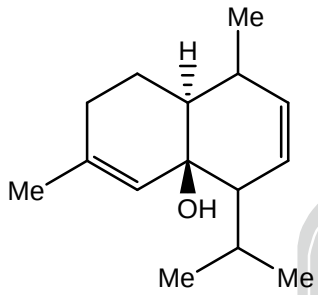

(b) 

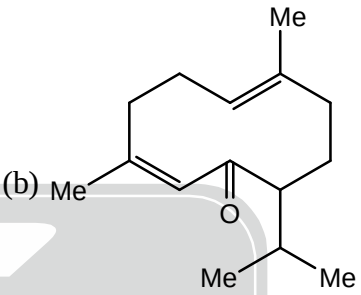

(c) 

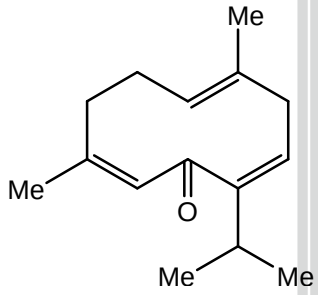

(d) 

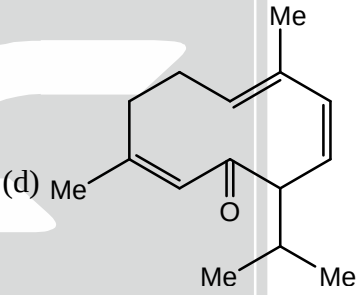

49. The major product (P) is,



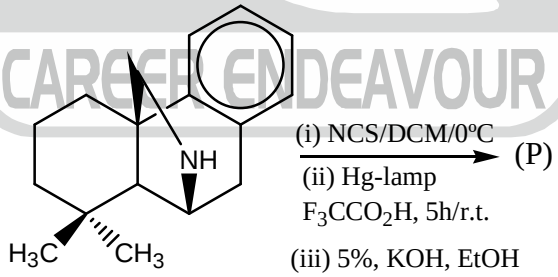

(a) 

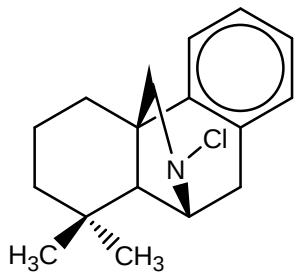

(b) 

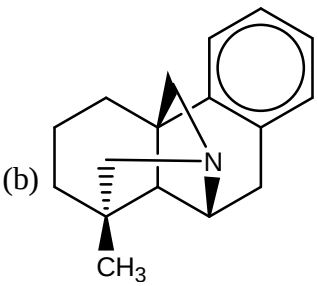

(c) 

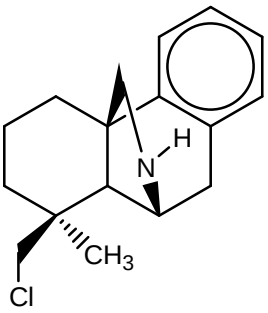

(d) 

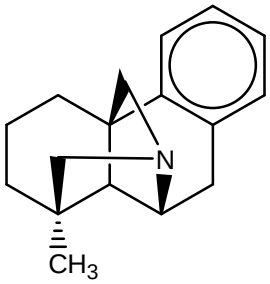

50. The major product (P) is



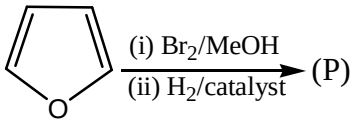

(a) 

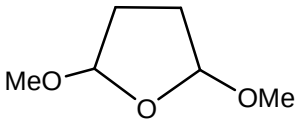

(b) 

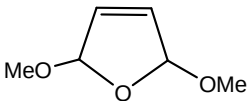
(c) 

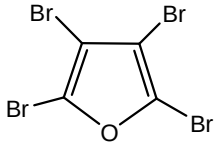
(d) 

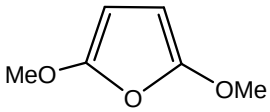
51. The major product (P) is



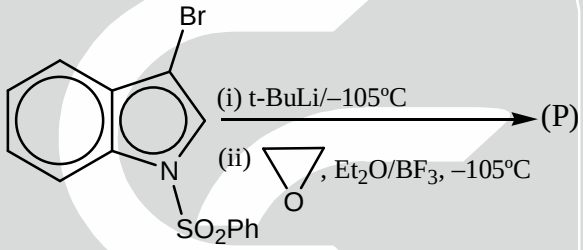
(a) 

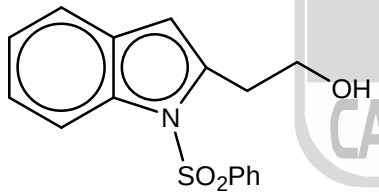
(b) 

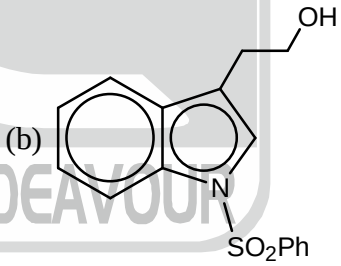
(c) 

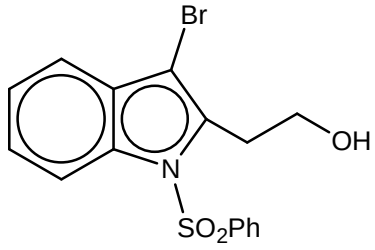
(d) 

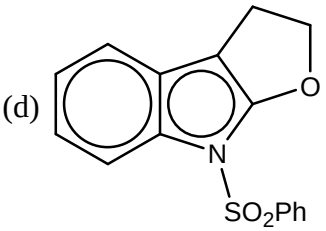
52. The major product (P) is



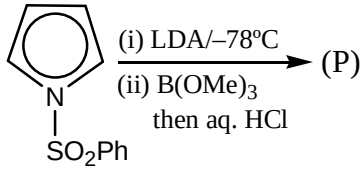
(a) 

(b) 

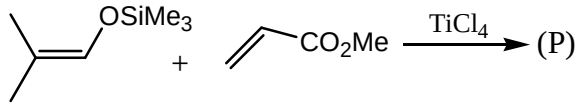
(c) 

(d) 

53. In the following reaction sequence the number of oxygen atoms in the product (P) is/are



54. In the following reaction, the product (P) shows following spectral data



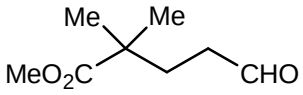

M.F. = $C_8H_{14}O_3$

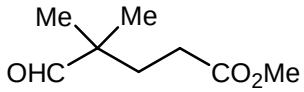
$\nu_{max}$ ($cm^{-1}$) = 1745, 1730

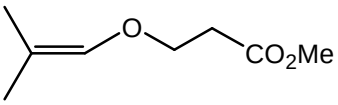
$\delta_c\,(ppm) = 202, 176, 62, 48, 34, 22, 15$

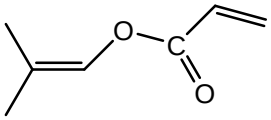
$\delta_H\,(ppm) = 1.21(6H, s), 1.8(2H, t, J = 7\ Hz), 2.24(2H, t, J = 7Hz), 4.3(3H, s), 10.01(1H, s)$

The correct structure of product (P) is

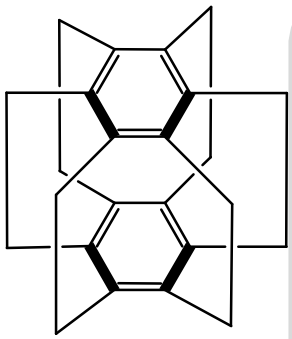
(a) 

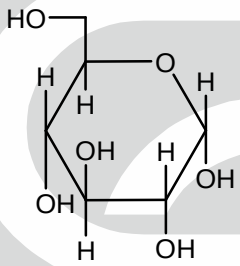

(b) 


(c) 


(d) 


55. The number of $^{13}C$ NMR signals exhibited by the compounds (A-C), are, respectively

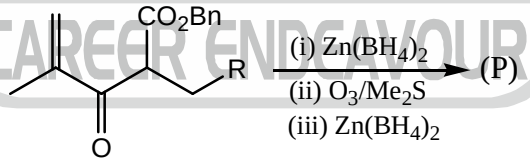
(A) 

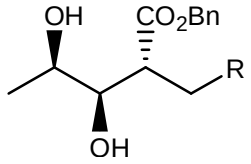
(B) 

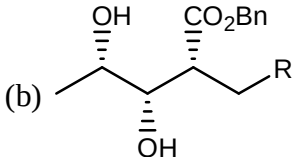

(C) 

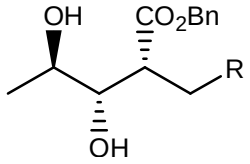

(a) 4, 5, 5 (b) 4, 6, 6 (c) 2, 5, 7 (d) 2, 6, 7

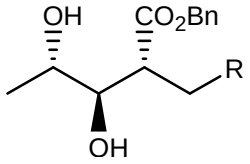
56. The major product (P) formed in following reaction:



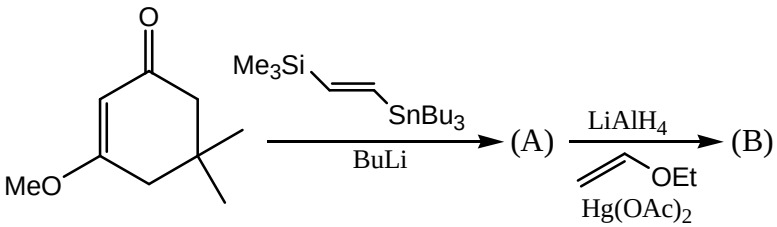

(a) 

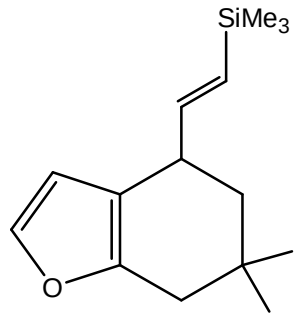

(b) 

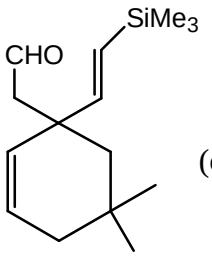

(c) 

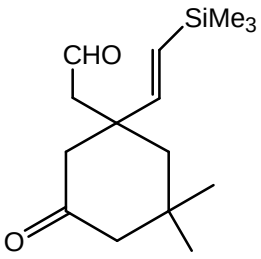

(d) 

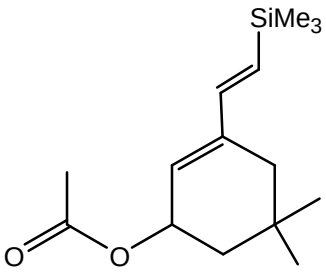

57. The major product (B) formed in the following reaction sequence,



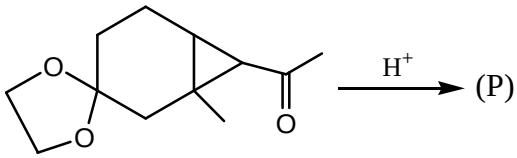
(a) 

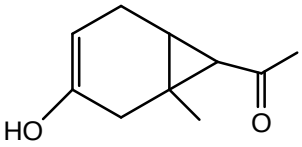

(b) 

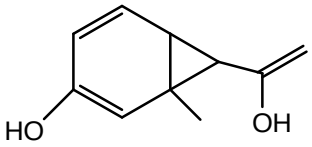

(c) 

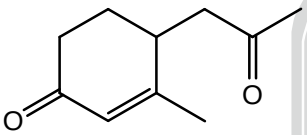

(d) 

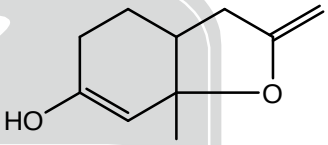

58. The major product (P) formed in the following reaction



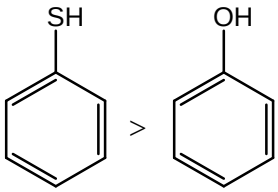

(a) 


(b) 

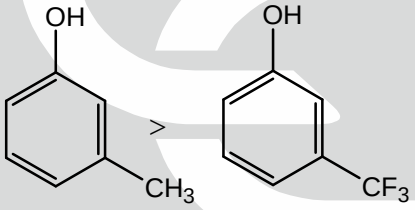

(c) 


(d) 

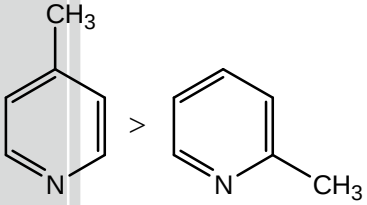

59. Total number of pairs with correct order of the respective property is _____



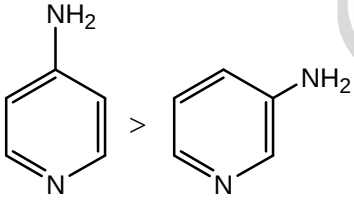

Acidity



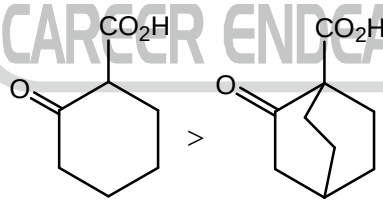

Acidity



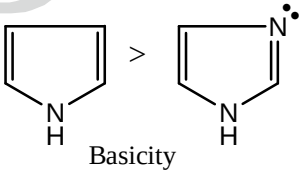

Nucleophilicity




Basicity

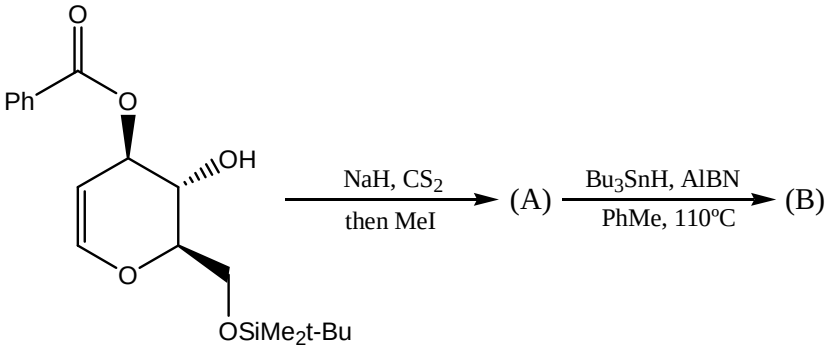


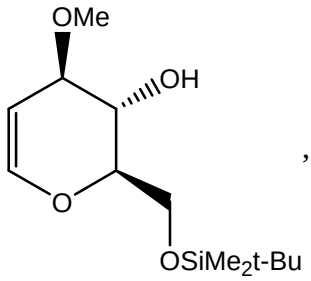

Decarboxylation
(acidic medium)

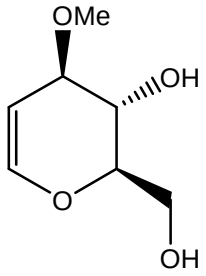


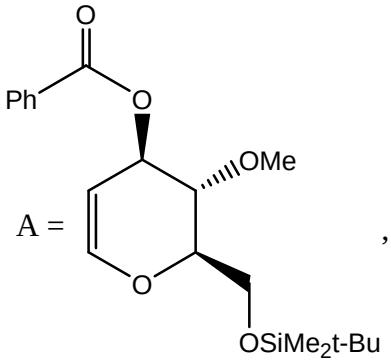

Basicity

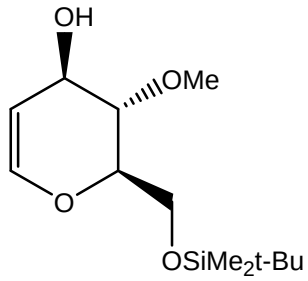
60. The products A and B in the following reaction sequence are

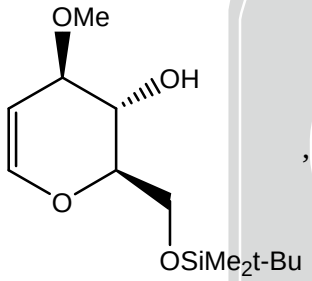


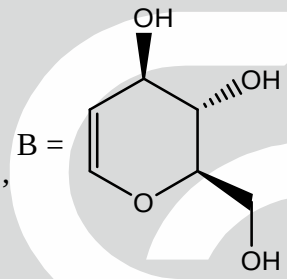
(a) A = 

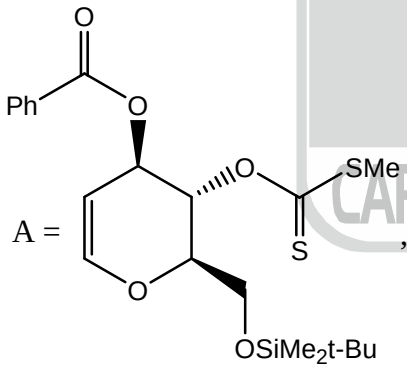
, B = 

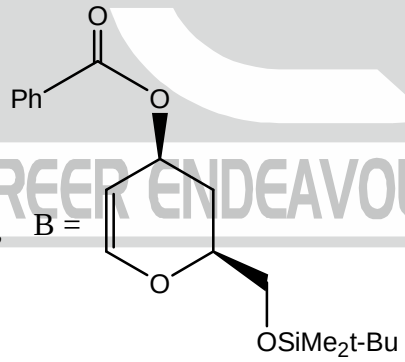

(b) A = 

, B = 

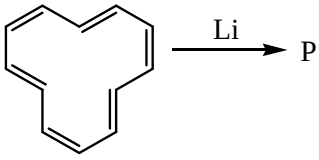

(c) A = 

, B = 


(d) A = 

, B = 

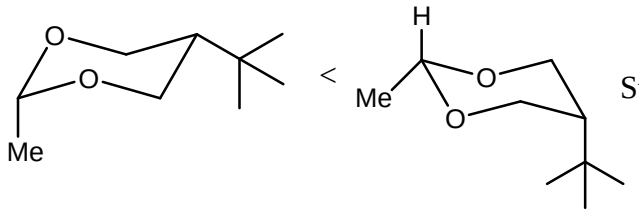

61. A tetra peptide made up of natural amino acids, has alanine as the N-terminal residue which is coupled to a chiral amino acid. Upon complete hydrolysis, the tetrapeptide gives glycine, alanine, phenylalanine and luecine. The number of possible sequence of tetrapeptide is _____

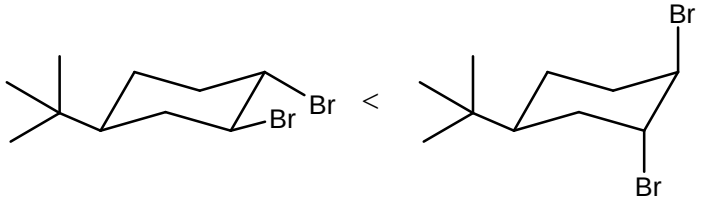
62. 

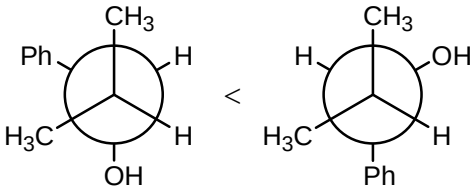

The product 'P' is:

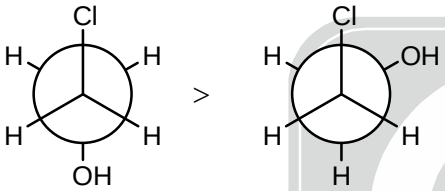
(a) Non-aromatic (b) Aromatic (c) Antiaromatic (d) Homoaromatic

63. In the following compounds, incorrect order of their stability is

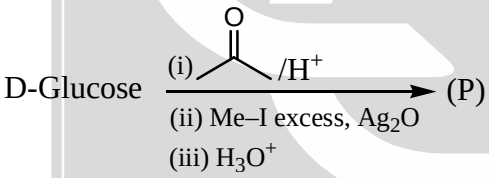
(a)  Stability order

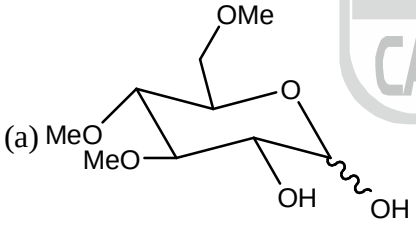
(b)  Stability order

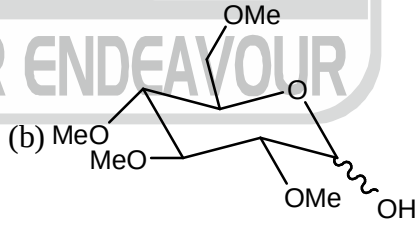
(c)  Stability order

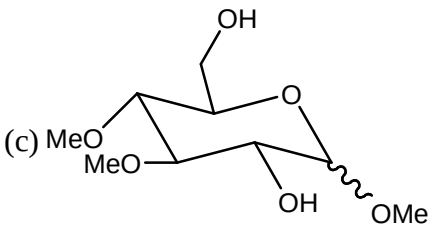
(d)  Stability order

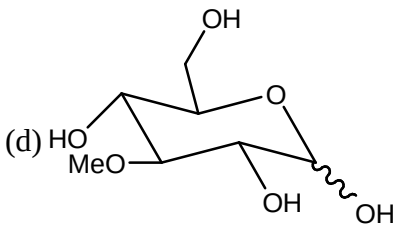
64. The major product (P) is




(a) 

(b) 

(c) 

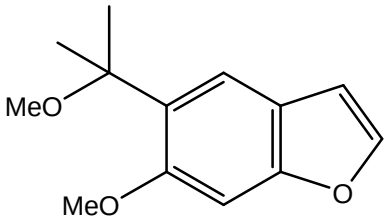
(d) 

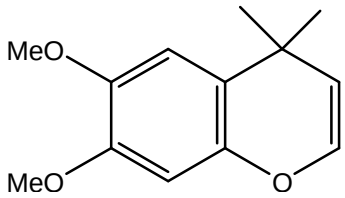
65. Precocene is a compound that cause insect Larvae to pupate and can also be found in some plants (*Ageratum spp.*), where it may act as an insecticide. It was isolated in minute amounts and has the following spectroscopic details.

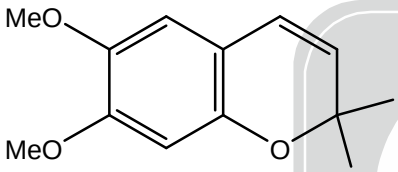
Mass spectrum : m/z (high resolution gives $C_{13}H_{16}O_3$).
M-15(100%) and M-30 (weak)

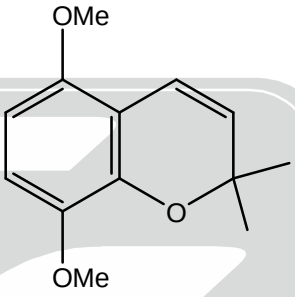
$^1$H NMR = $\delta_H\,(ppm) =$ $1.34(6H, s), 3.80(3H, s), 3.82\,(3H, s), 5.54(1H, d, J = 10\ Hz)$
$6.37\,(1H, d, J = 10\ Hz), 6.42\,(1H, s), 6.58(1H, s)$

The correct structure of Precocene is

(a) 


(b) 


(c) 


(d) 

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***Space for rough work***

# CHEMISTRY - CY

## GATE TEST SERIES-B

**Date: 12-01-2019**

## ORGANIC CHEMISTRY

## ANSWER KEY

### PART-A

| | | | | |
|---|---|---|---|---|
| **1.** (c) | **2.** (c) | **3.** (b) | **4.** (d) | **5.** (b) |
| **6.** (d) | **7.** (c) | **8.** (d) | **9.** (d) | **10.** (b) |

### PART-B

| | | | | |
|---|---|---|---|---|
| **11.** (d) | **12.** (b) | **13.** (b) | **14.** (3) | **15.** (c) |
| **16.** (d) | **17.** (d) | **18.** (b) | **19.** (b) | **20.** (a) |
| **21.** (7) | **22.** (6) | **23.** (3) | **24.** (b) | **25.** (c) |
| **26.** (b) | **27.** (a) | **28.** (a) | **29.** (3) | **30.** (b) |
| **31.** (b) | **32.** (c) | **33.** (a) | **34.** (58) | **35.** (c) |
| **36.** (b) | **37.** (8.5 to 8.9) | **38.** (2) | **39.** (34.0 to 34.5) | **40.**(d) |
| **41.** (2) | **42.** (b) | **43.** (d) | **44.** (d) | **45.** (c) |
| **46.** (c) | **47.** (a) | **48.** (a) | **49.** (b) | **50.** (d) |
| **51.** (a) | **52.** (b) | **53.** (4) | **54.** (b) | **55.** (d) |
| **56.** (d) | **57.** (b) | **58.** (c) | **59.** (4) | **60.** (d) |
| **61.** (4) | **62.** (b) | **63.** (d) | **64.** (d) | **65.** (c) |