

Target IIT-JAM-2017

Test Series-2

ORGANIC CHEMISTRY

Booklet Code: **B**

Duration: 2:00 Hours

CHEMISTRY-CY

Date: 08-01-2017

Maximum Marks: 100

Read the following instructions carefully:

1. Attempt all the questions.
2. **Section-A** contains **30** Multiple Choice Questions (MCQ). Each question has 4 choices (a), (b), (c) and (d), for its answer, out of which **ONLY ONE** is correct. From **Q.1 to Q.10** carries 1 Marks and **Q.11 to Q.30** carries 2 Marks each.
3. **Section-B** contains **10** Multiple Select Questions (MSQ). Each question has 4 choices (a), (b), (c) and (d) for its answer, out of which **ONE or MORE than ONE** is/are correct. For each correct answer you will be awarded **2 marks**.
4. **Section-C** contains **20** Numerical Answer Type (NAT) questions. From **Q.41 to Q.50** carries **1 Mark** each and **Q.51 to Q.60** carries **2 Marks** each. For each NAT type question, the value of answer is in between 0 to 9.
5. In all sections, questions not attempted will result in zero mark. In Section-A (MCQ), wrong answer will result in negative marks. For all **1 mark** questions, **1/3 marks** will be deducted for each wrong answer. For all **2 marks** questions, **2/3 marks** will be deducted for each wrong answer. In Section-B (MSQ), there is no negative and no partial marking provision. There is no negative marking in Section-C (NAT) as well.

Regn. No.

Name of StudentBatch.....

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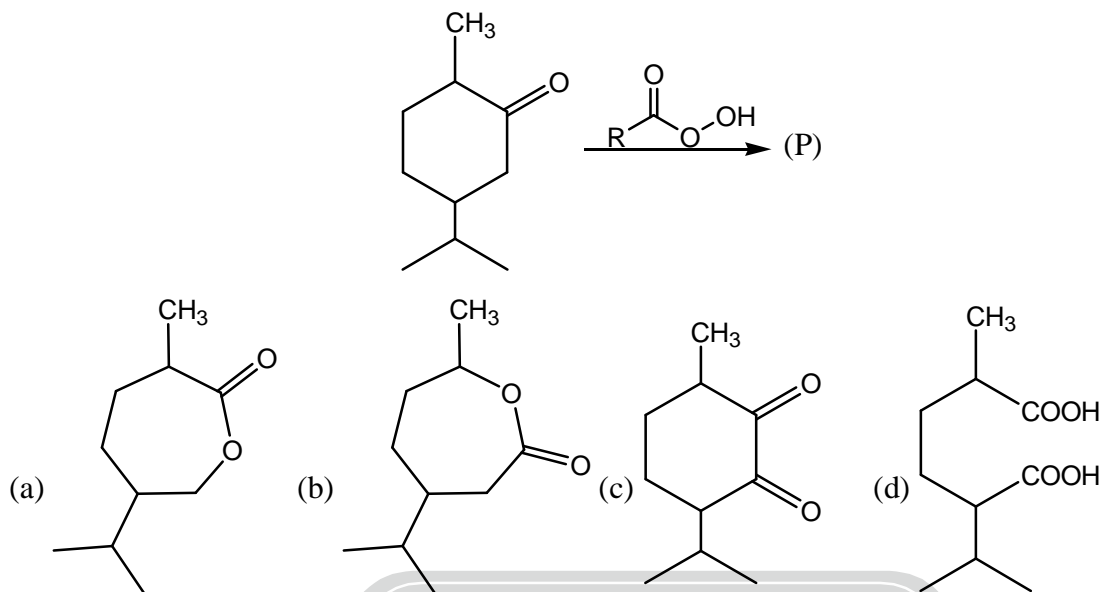
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Section-A : Multiple Choice Questions (MCQ)

Q.1 to Q.10: Carry 1 Mark each.

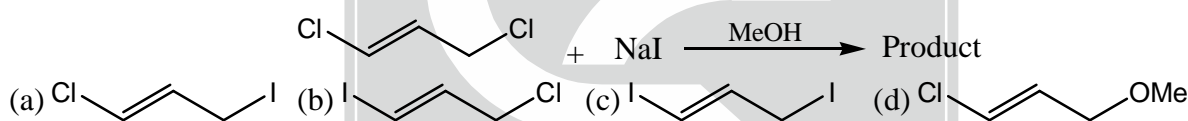
1. The major product (P) formed will be



2. Which of the following is most reactive as a nucleophile



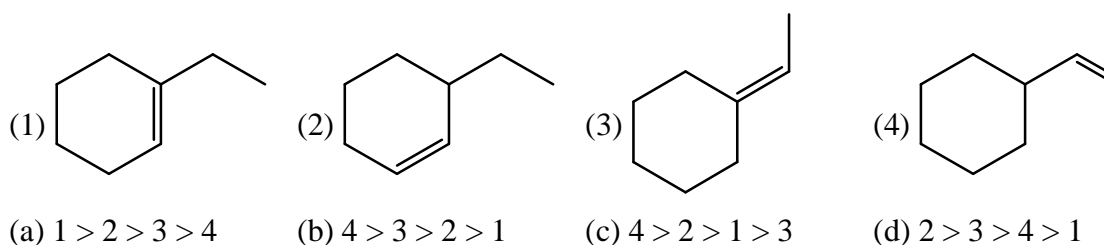
3. Which compound is the major product of the following reaction



4. Which ketone has the largest equilibrium constant for hydration



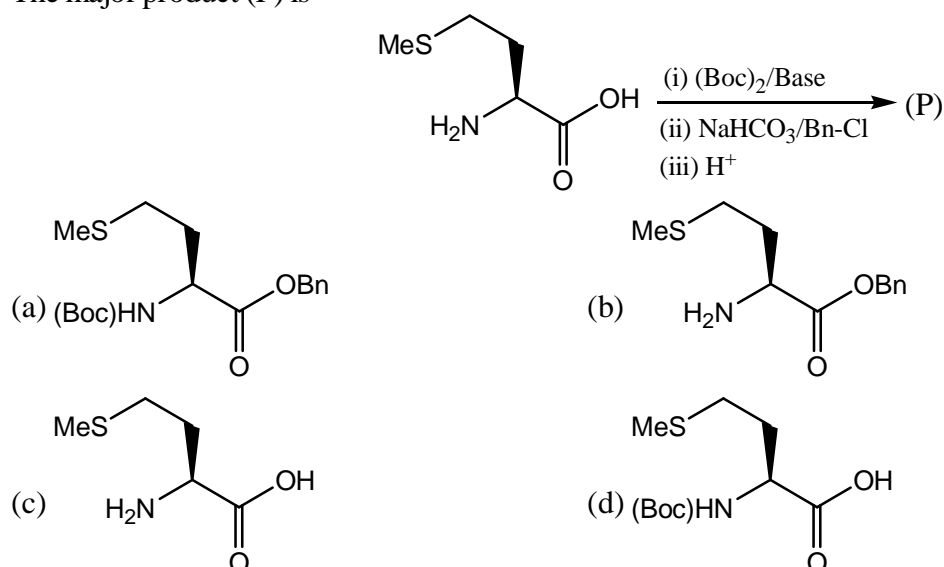
5. Decreasing order of heat of hydrogenation in the following Alkenes.



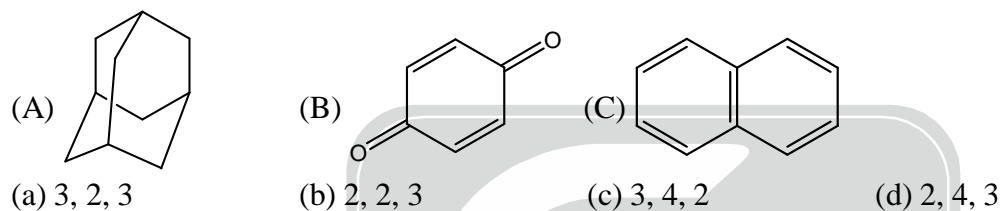
6. The incorrect statement(s) about the furan is/are

- (a) Furan gives electrophilic substitution reaction faster than benzene
 (b) Furan is less aromatic than benzene
 (c) Furan gives poly bromination with Br_2 in non-alcoholic solvents.
 (d) Furan does not give Diels-Alder reaction

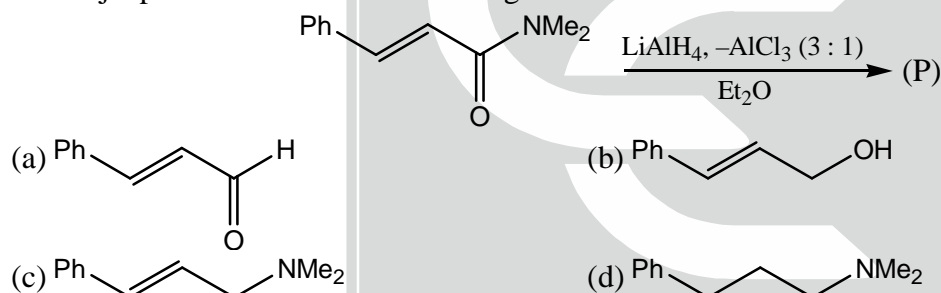
7. The major product (P) is



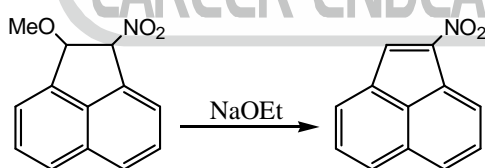
8. How many signals would you expect in the ^{13}C NMR of the following compounds, respectively



9. The major product formed in the following reaction



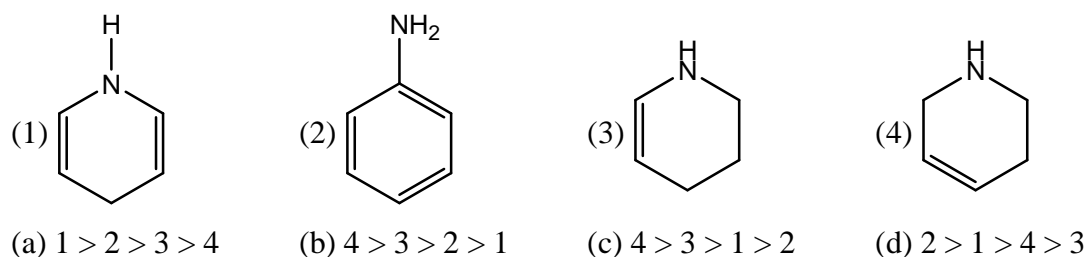
10. The reaction given below is an example of

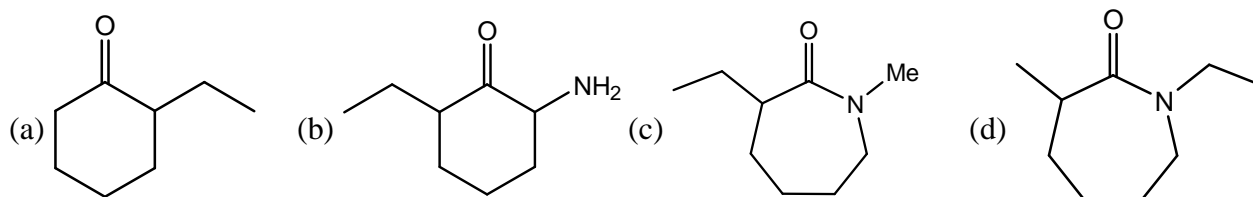
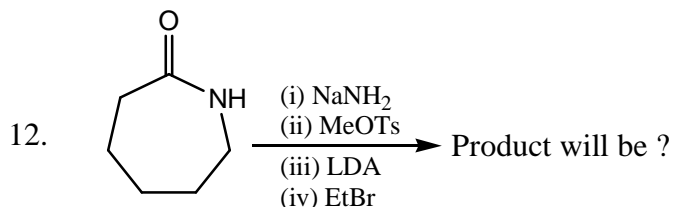


- (a) E_2 -elimination (b) E_1 -elimination
 (c) syn-elimination (d) E_1CB -elimination

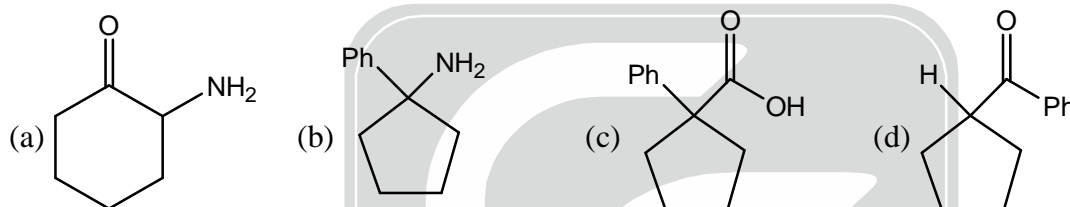
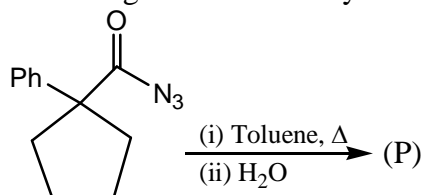
Q.11 to Q.30: Carry 2 Marks each.

11. Order of basicity in following compound will be

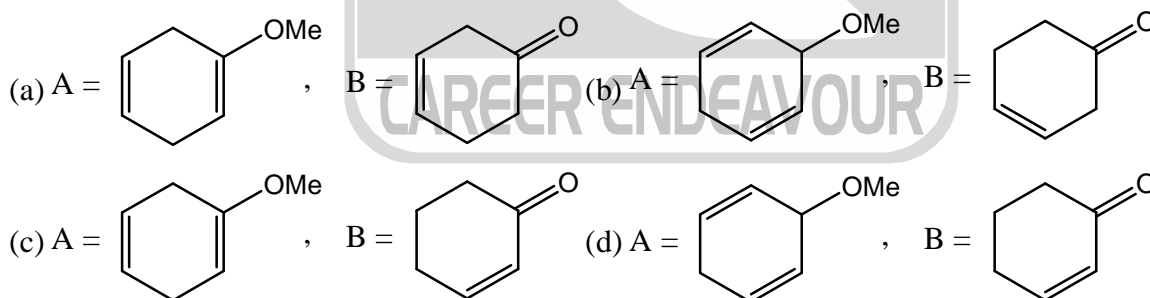
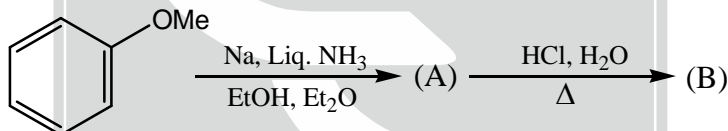




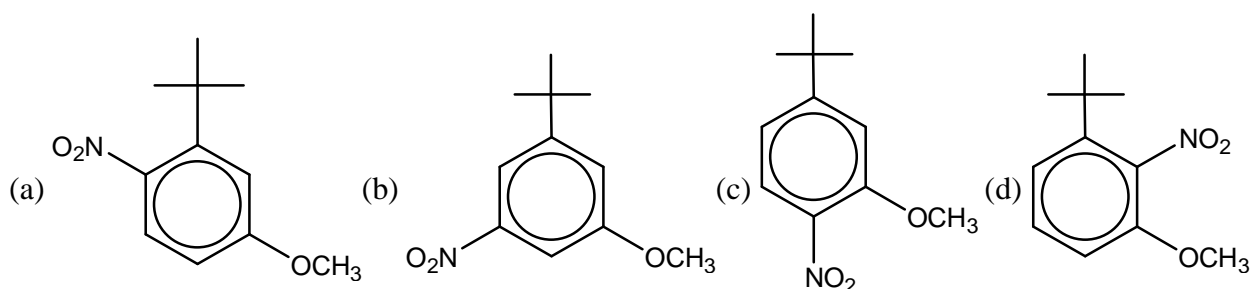
13. Which is the major product of the following reaction of an acyl azide?

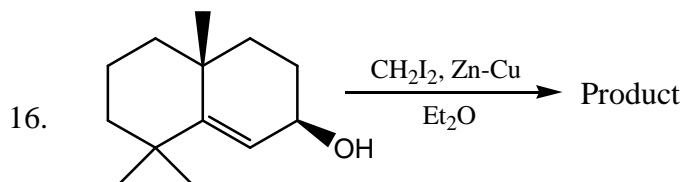


14. Which combination of compounds in a-d identifies A and B in the following reaction

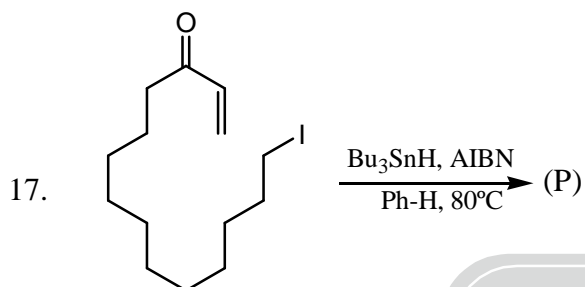
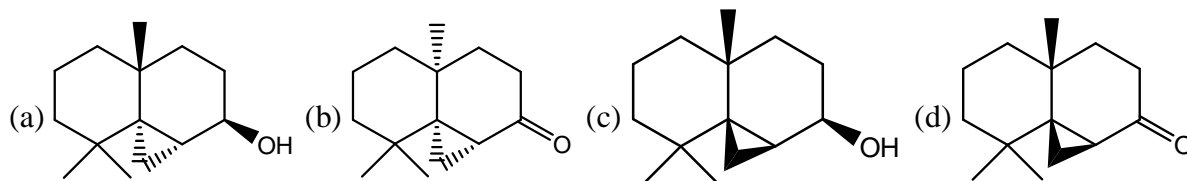


15. Which is obtained as the main product upon reaction of m-t-butylanisole (1-t-butyl-3-methoxybenzene) with conc. ($\text{HNO}_3 + \text{H}_2\text{SO}_4$)

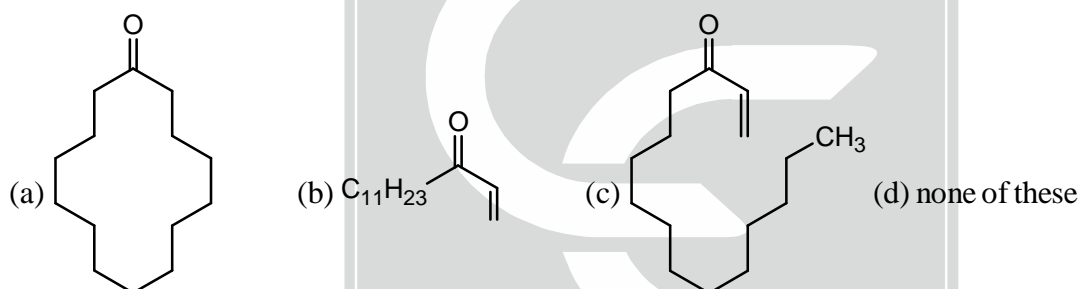




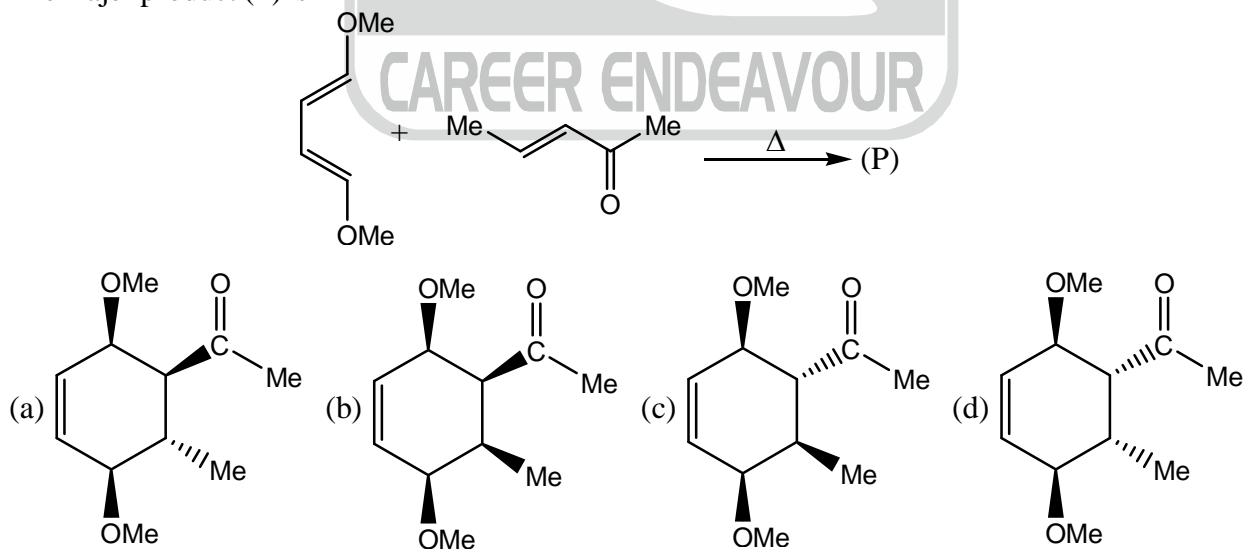
The major product formed will be



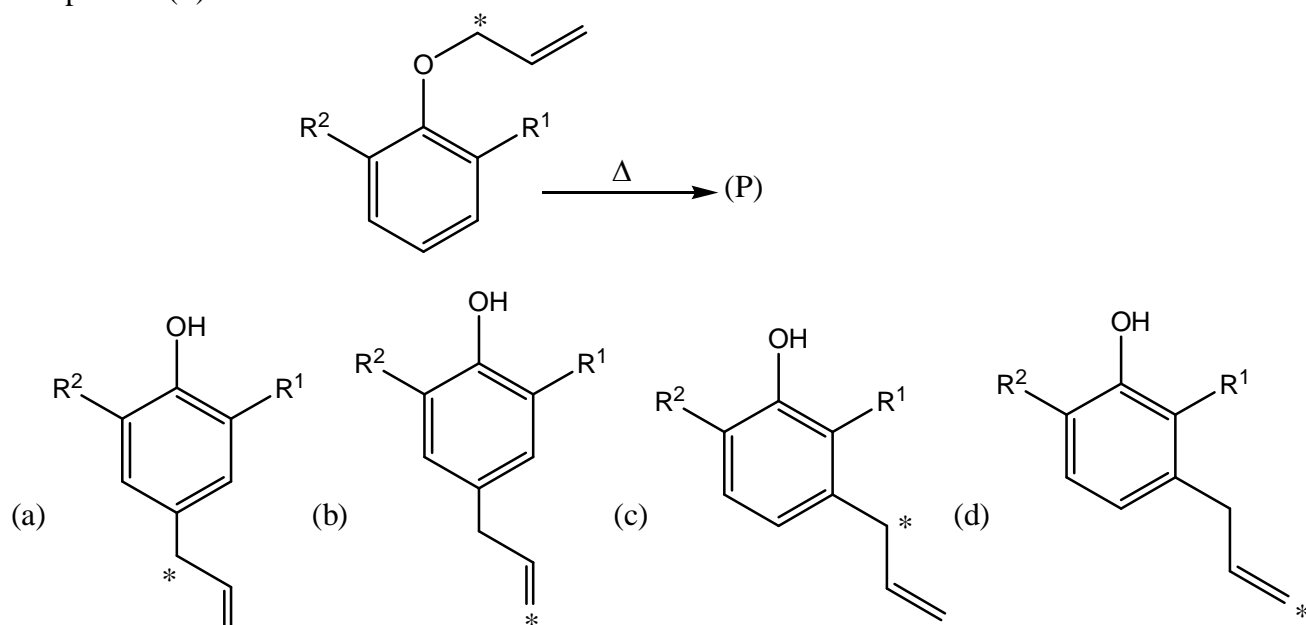
The major product formed in the above reaction is



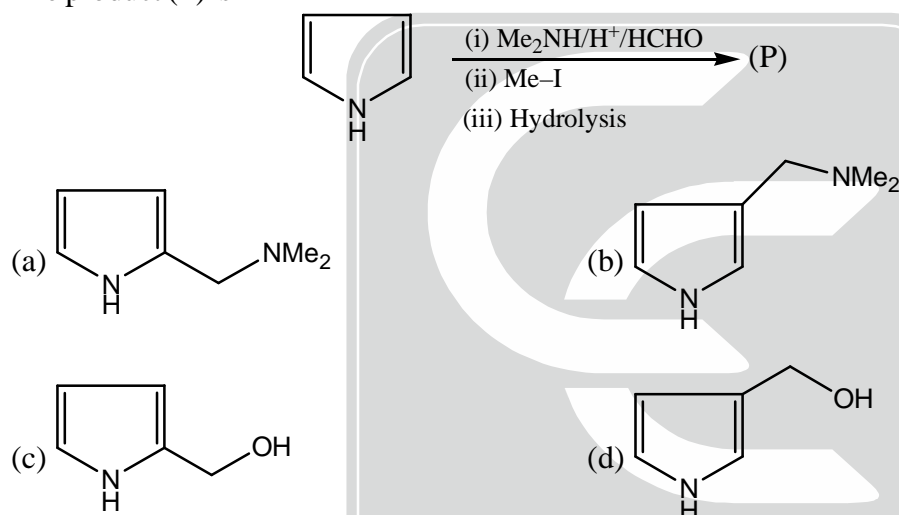
18. The major product (P) is



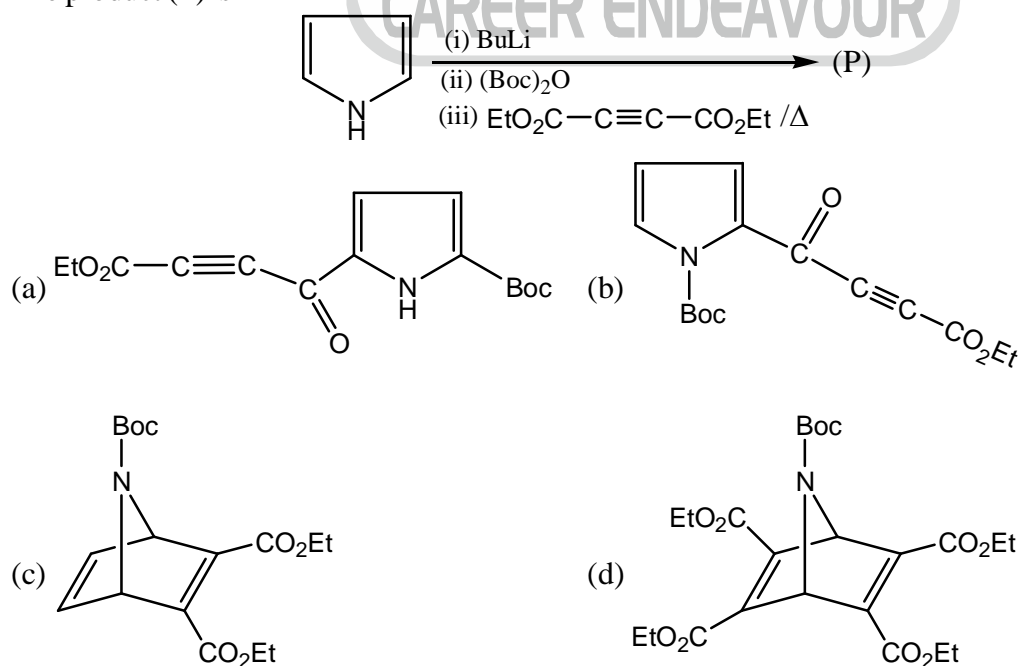
19. The product (P) is



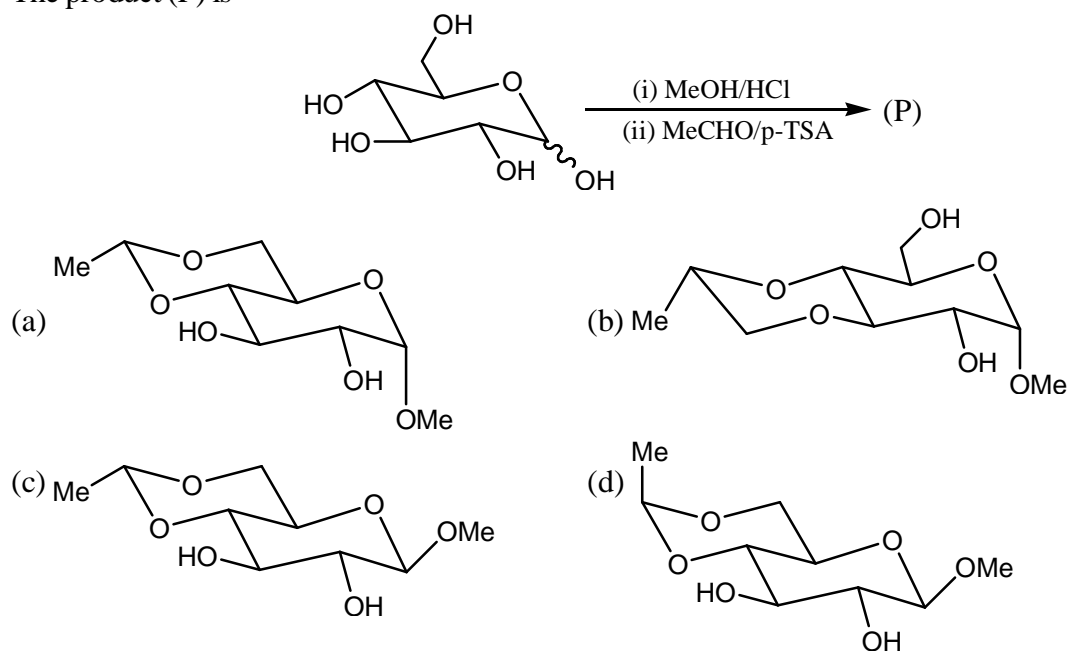
20. The product (P) is



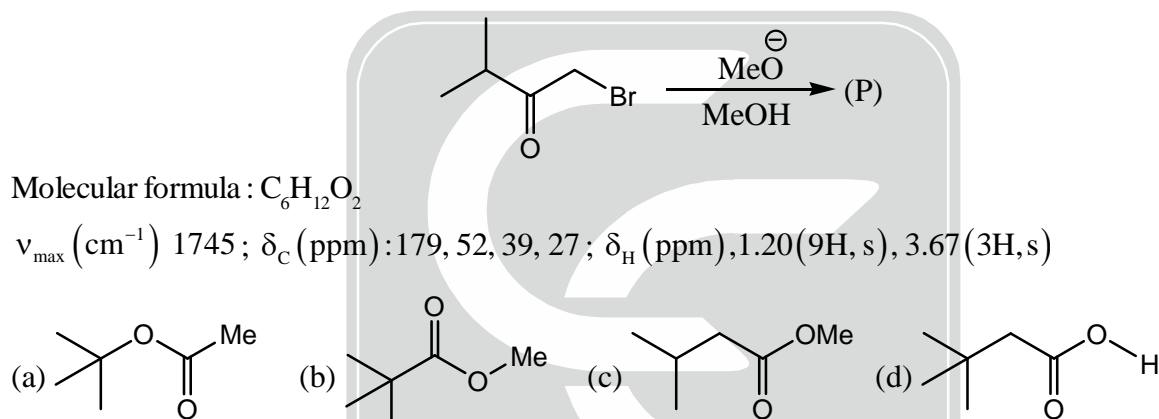
21. The product (P) is



22. The product (P) is



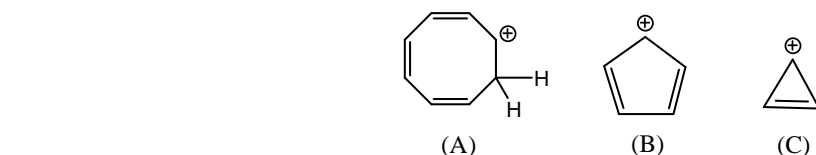
23. Suggests structure for the products of these reactions, interpreting the spectroscopic data



24. The configuration at the two stereocentres in the compound given below are



25. Among the carbocations given below

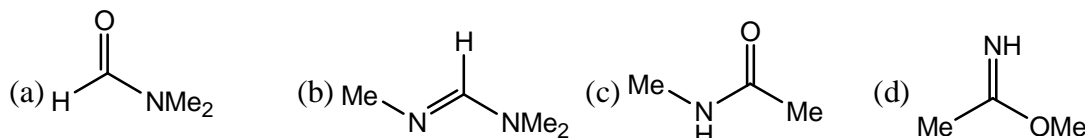


- (a) A is homoaromatic, B is antiaromatic and C is aromatic.
 (b) A is aromatic, B is antiaromatic and C is homoaromatic.
 (c) A is antiaromatic, B is aromatic and C is harmoaromatic.
 (d) A is homoaromatic, B is aromatic and C is antiaromatic.

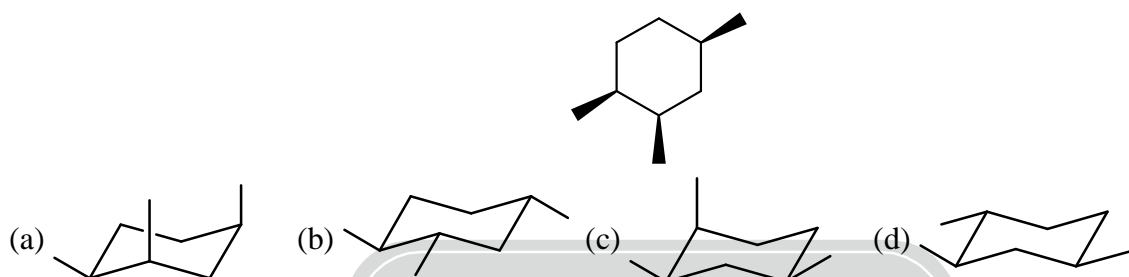
26. The order of carbonyl stretching frequency in the IR spectra of ketone, amide and anhydride is:

- (a) Anhydride > amide > ketone (b) Ketone > amide > anhydride
 (c) Amide > anhydride > ketone (d) Anhydride > ketone > amide

27. In the ^1H NMR spectrum recorded at 293 K, an organic compound ($\text{C}_3\text{H}_7\text{NO}$), exhibited signals at δ 7.8 (1H, s), 2.8 (3H, s) and 2.6 (3H, s). The compound is



28. Consider the following statements for [18]-annulene
 (A) It is aromatic
 (B) The inner protons resonate at δ 9.28 in its ^1H NMR spectrum
 (C) There are six protons in the shielded zone.
 (a) A, B, C (b) A and B only (c) B and C only (d) A and C only
29. Among the structures given below, the most stable conformation for the following compound is



30. The gauche conformation ($\phi = 60^\circ$) of n-butane possesses
 (a) plane of symmetry; and is achiral (b) C_2 -axis of symmetry; and is chiral
 (c) centre of symmetry; and is achiral (d) plane of symmetry; and is chiral

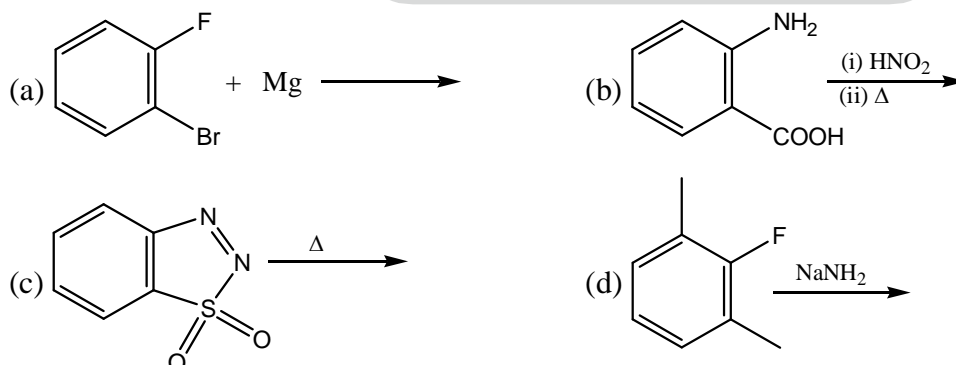
Section-B : Multiple Select Questions (MSQ)

Q.31 to Q.40: Carry 2 Marks each.

31. Select the compounds undergoing inter or intra molecular Cannizzaro reaction

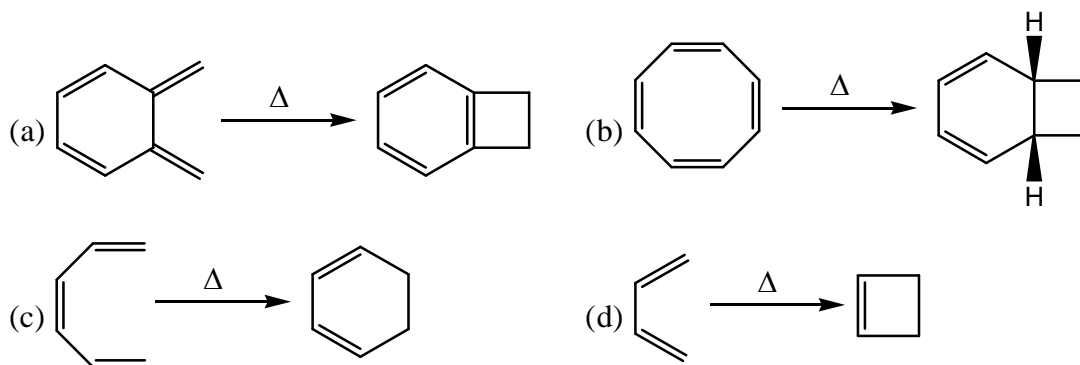


32. In which reactions benzyne will be formed as intermediate

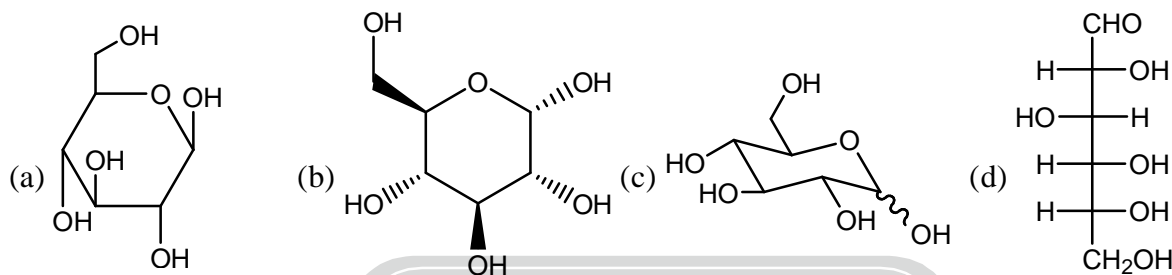


33. The incorrect statement(s) about the heterocyclic compounds is/are
 (a) Pyrrole gives electrophilic substitution reaction while as pyridine give nucleophilic substitution reactions
 (b) Pyrrole does not act as basic while as pyridine does.
 (c) Furan and thiophene gives electrophilic substitution reactions with equal rate
 (d) Pyrrole gives nucleophilic addition reaction with Grignard reagent.

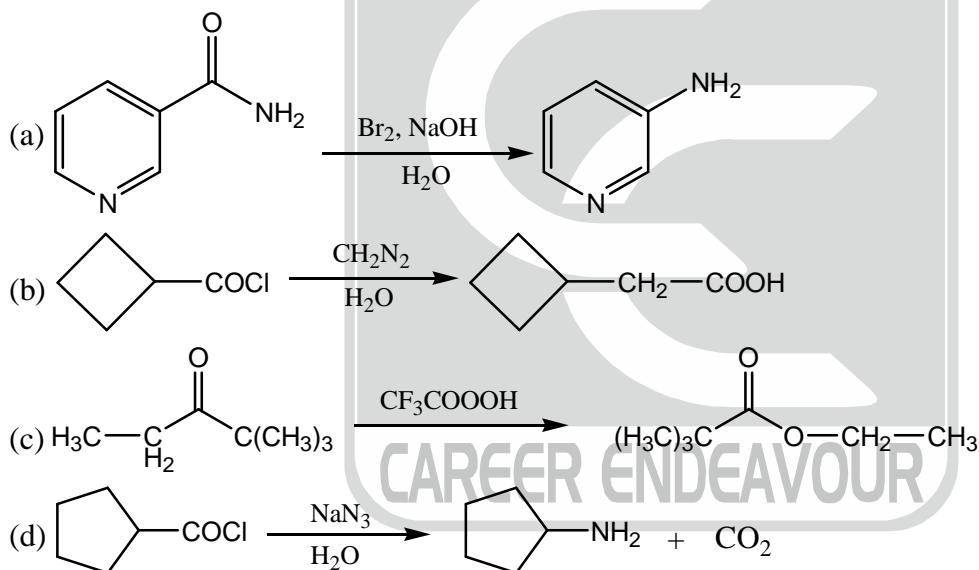
34. In which the product is formed through dis-rotation



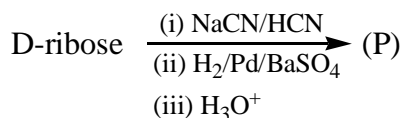
35. The correct structure of the D-glucose is/are



36. Which of the following equation shown as correct product



37. The products formed in the following reaction is/are

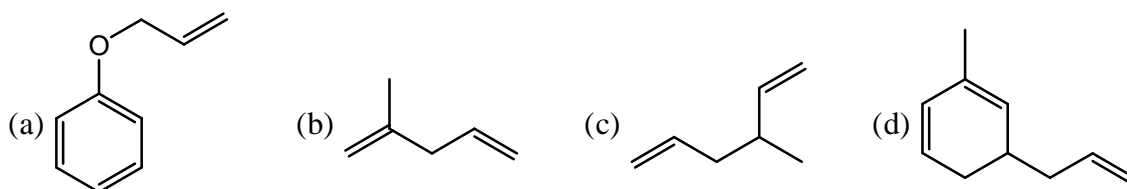


- (a) D-Allose (b) D-Altrose (c) D-Glucose (d) D-Mannose

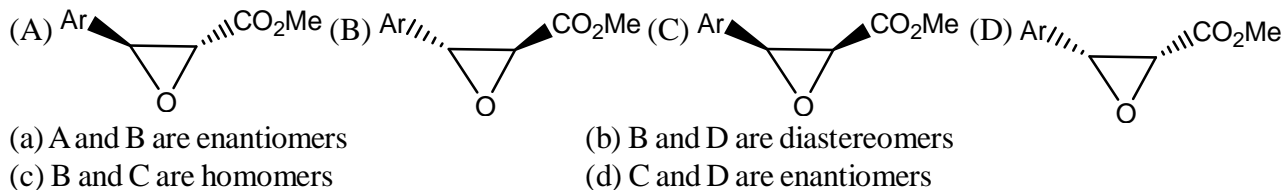
38. The correct statement(s) about the Diels-Alder reaction is/are

- (a) electron donating groups on diene increases, the rate of Diels-Alder reaction
 (b) electron donating groups on Dienophile decreases, the rate of Diels-Alder reaction
 (c) Anthracene gives Diels-Alder reaction while as benzene does not give
 (d) Aromatic character is directly proportional to the reactivity of Diels-Alder reactions

39. The number of compounds which under goes [3, 3] sigmatropic shift



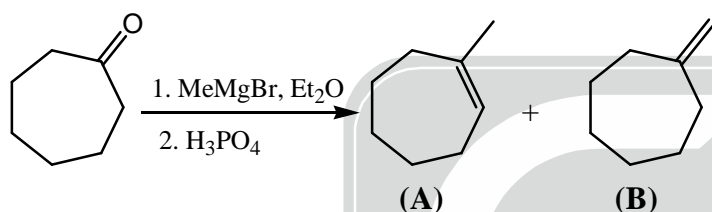
40. The correct statement(s) about the given compounds



Section-C : Numerical Answer Type (NAT)

Q.41 to Q.50: Carry 1 Mark each.

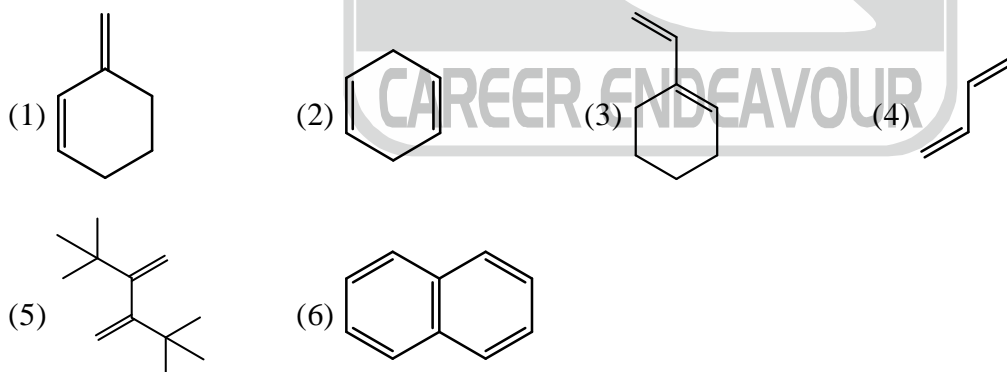
41. Among the following, how many incorrect statement for the following reaction is/are _____



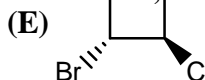
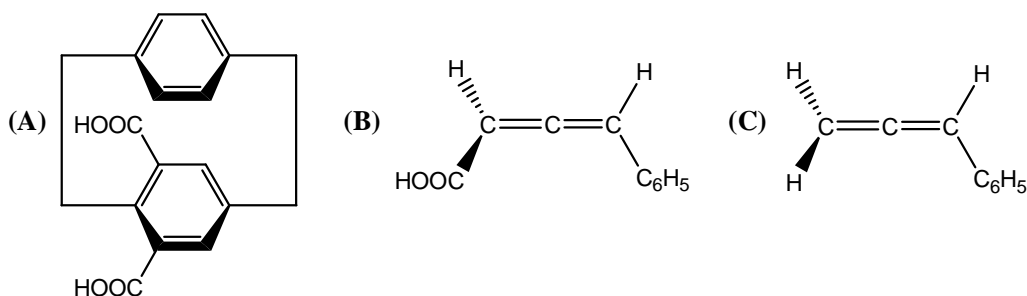
- (1) A is the major product and it will have five signals in the proton decoupled ^{13}C NMR spectrum
(2) A is the minor product and it will have eight signals in the proton decoupled ^{13}C NMR spectrum
(3) B is the major product and it will have five signals in the proton decoupled ^{13}C NMR spectrum
(4) B is the minor product and it will have five signals in the proton decoupled ^{13}C NMR spectrum

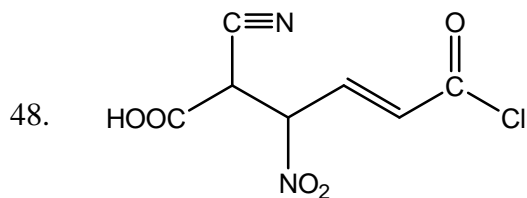
42. Nucleophilic substitution reactions of pyridine occurs at which position _____

43. The number of compounds which undergoes Diels-Alder reaction



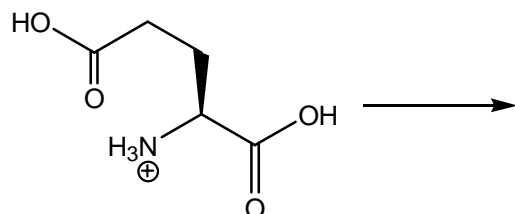
44. How many in the following molecules are chiral





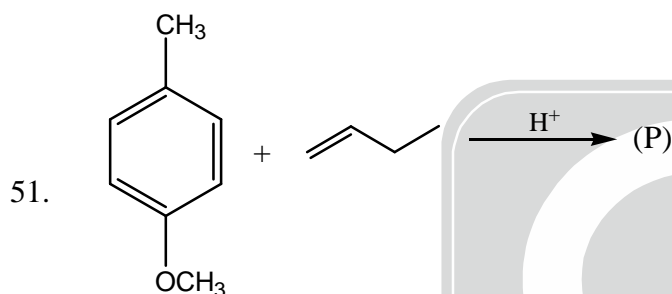
In the above structure, how many functional groups not reduce by borane.

49. Calculate the pI of the following salt of amino acid having pKa value $x = 2.2$, $y = 3.9$ and $z = 7.9$ respectively.



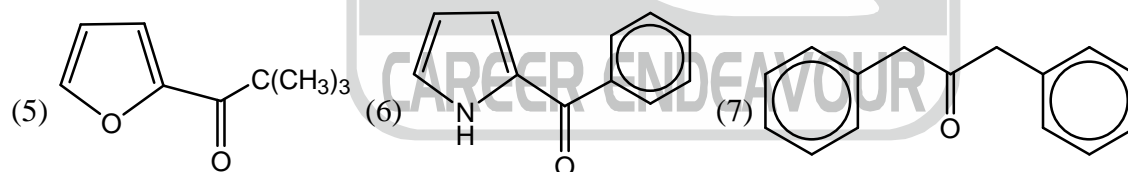
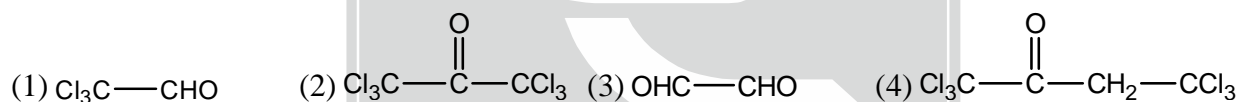
How many products will be formed upon the bromination of furan in alcoholic and non-alcoholic solvent.

Q.51 to Q.60: Carry 2 Marks each.

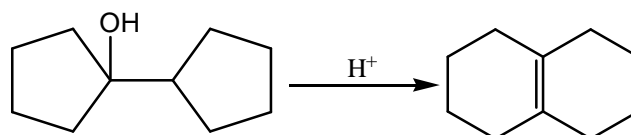


How many product will be formed in above reaction.

52. How many compounds gives cannizaro reaction

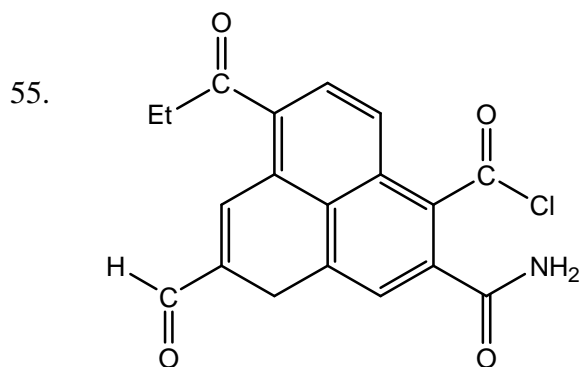
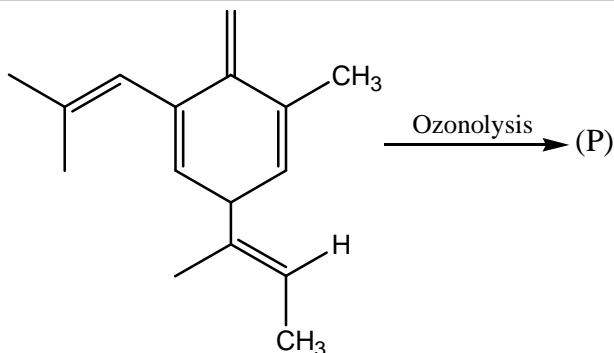


53. Reaction,



How many intermediate (carbocations) will be form in above conversion.

54. How many products will be formed on ozonolysis of following compound



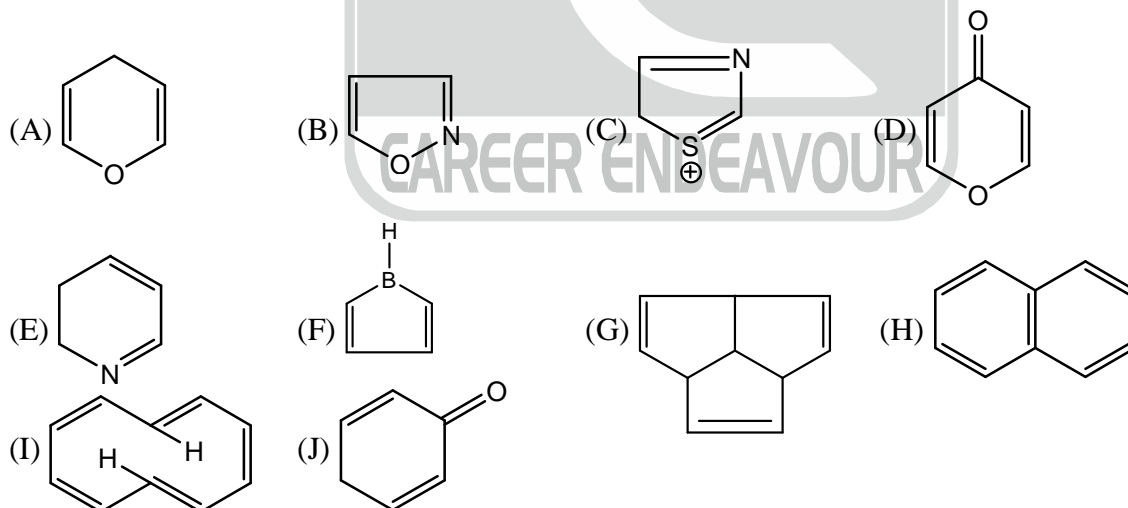
Number of moles of CH_3MgBr required to neutralise above compound is/are _____

56. Among the following neutral amino acids is/are

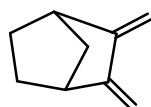
- (1) Lysine (2) Arginine (3) Valine (4) Aspartic acid
 (5) Isoleucine (6) Tryptophan (7) Leucine

57. The $[\alpha]_D$ of a 90% optically pure 2-arylpropanoic acid solution is $+135^\circ$. On treatment with a base at RT for one hour, $[\alpha]_D$ changed to $+120^\circ$. The optical purity is reduced to 40% after 3 hours. If so, its specific rotation after 3 hours would be _____ degree.

58. Among the following, how many are aromatic in nature?

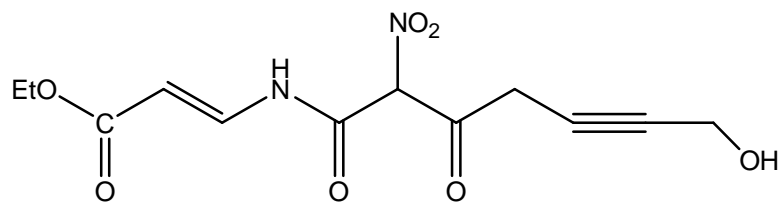


59. For the below compound



The λ_{max} value is _____ $\text{m}\mu$.

60.



In the above structure, how many functional groups are reduced by LiAlH_4 .



***** END OF QUESTION PAPER *****



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Space for Rough Work





IIT-JAM CHEMISTRY-CY

TEST SERIES - 2 (Organic Chemistry)

Date : 08-01-2017

Booklet : **B**

ANSWER KEY

Section-A : Multiple Choice Questions (MCQ)

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (b) | 2. (b) | 3. (a) | 4. (a) | 5. (c) |
| 6. (d) | 7. (b) | 8. (b) | 9. (c) | 10. (d) |
| 11. (c) | 12. (c) | 13. (b) | 14. (c) | 15. (c) |
| 16. (c) | 17. (a) | 18. (a) | 19. (a) | 20. (c) |
| 21. (c) | 22. (a) | 23. (b) | 24. (a) | 25. (a) |
| 26. (d) | 27. (a) | 28. (d) | 29. (c) | 30. (b) |

Section-B : Multiple Select Questions (MSQ)

- | | | | |
|----------------------|-------------------|-------------|------------------|
| 31. (a),(b), (c) | 32. (a),(b), (c) | 33. (c),(d) | 34. (b), (c) |
| 35. (a),(b),(c), (d) | 36. (a), (b), (d) | 37. (a),(b) | 38. (a),(b), (c) |
| 39. (a), (c), (d) | 40. (a), (b), (d) | | |

Section-C : Numerical Answer Type (NAT)

- | | | | |
|--------------------|---------|-----------|---------|
| 41. (3) | 42. (2) | 43. (2) | 44. (1) |
| 45. (1755 to 1765) | 46. (4) | 47. (4) | 48. (2) |
| 49. (3.05) | 50. (2) | 51. (1) | 52. (5) |
| 53. (3) | 54. (5) | 55. (7) | 56. (4) |
| 57. (60) | 58. (3) | 59. (252) | 60. (5) |

