

# TEST SERIES CSIR-NET/JRF Dec. 2017

BOOKLET SERIES **C**

## ORGANIC CHEMISTRY

Paper Code **01**

Test Type: **TEST SERIES**

### CHEMICAL SCIENCES

Duration: 2:00 Hours

Date: 01-12-2017

Maximum Marks: 180

Read the following instructions carefully:

\* Single Paper Test is divided into **THREE** Parts.

**Part - A:** This part shall carry **10** questions. Each question shall be of **2** marks.

**Part - B:** This part shall carry **20** questions. Each question shall be of **2** marks.

**Part - C:** This part shall contain **30** questions. Each question shall be of **4** marks.

\* Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.

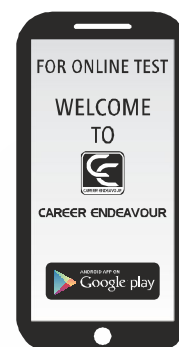
\* There will be negative marking @25% for each wrong answer.

\* The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

\* For rough work, blank sheet is attached at the end of test booklet.



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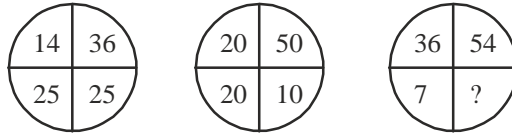


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## PART – A

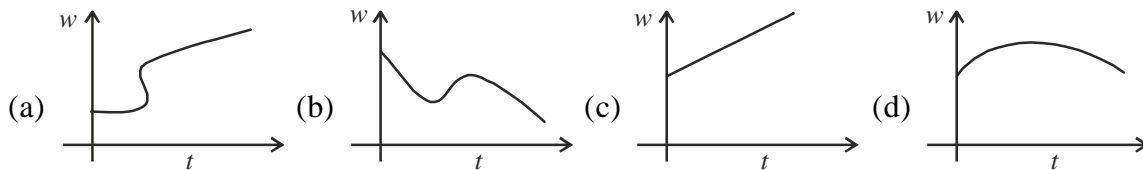
1. What is the last digit of  $7^{73}$ ?  
 (a) 7 (b) 9 (c) 3 (d) 1

2. Find the missing number :



- (a) 1 (b) 0 (c) 2 (d) 3

3. If we plot the weight ( $w$ ) versus age ( $t$ ) of a child in a graph, the one that will never be obtained from amongst the four graphs given below is



4. What will be the day of the week 15<sup>th</sup> August 2010?  
 (a) Sunday (b) Monday (c) Tuesday (d) Friday

5. Which of the following is not the member of the series  
 3, 5, 11, 14, 17, 21

- (a) 21 (b) 17 (c) 14 (d) 3

6. A motorboat, whose speed 15 km/hr in still water goes 30 km to downstream and comes back in a total of 4 hours 30 minutes. The speed of the stream (in km/hr) is

- (a) 4 (b) 5 (c) 6 (d) 10

7. If A and B together can complete a piece of work in 15 days and B alone in 20 days. In how many days can A alone complete the work?

- (a) 60 (b) 45 (c) 40 (d) 30

8. A is son of C while C and Q are the sisters to one another. Z is the mother of Q. If P is the son of Z, which one of the following statements is correct?

- (a) Q is the grandfather of A (b) P is the maternal uncle of A  
 (c) P is the cousin of A (d) Z is the brother of C

9. If Ravi moves 20 meters in East direction and then turns to his left and then moves 25 metres and then he turns to his right and moves 25 metres. After this he turn to his right and moves 15 meters. Now, how far is he from starting point?

- (a) 40 m (b) 50 m (c) 25 m (d) 45 m

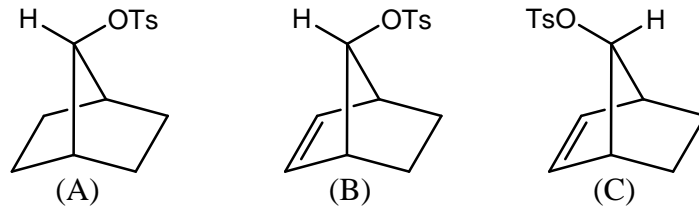
10. Find the missing character?

A	D	G
D	I	N
I	P	?

- (a) V (b) X (c) W (d) Y

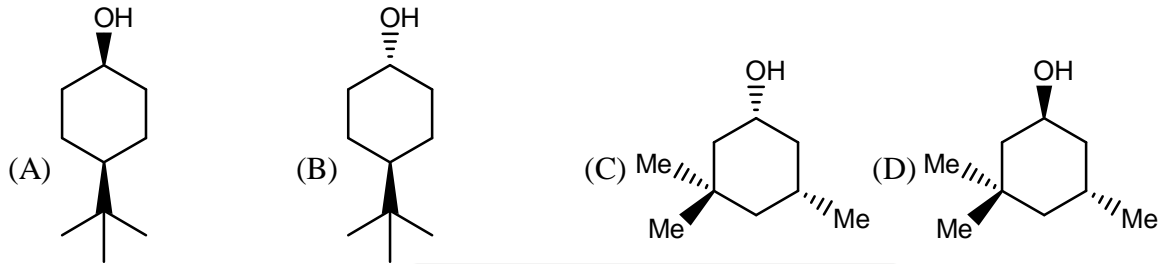
## PART – B

11. Arrange the relative rate of acetylation of the following norbornane derivatives



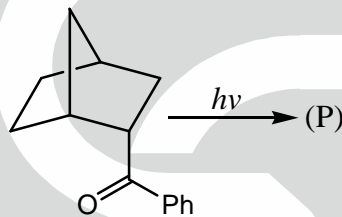
- (a)  $A > B > C$  (b)  $C > B > A$  (c)  $B > C > A$  (d)  $A < B \sim C$

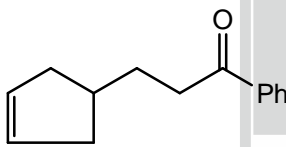
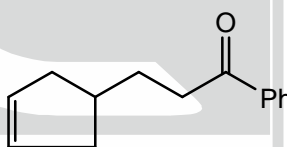
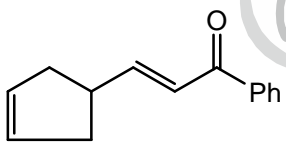
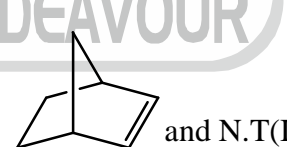
12. Arrange the relative rates of oxidation of typical cyclohexanols

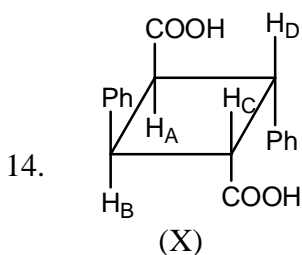


- (a)  $D > A > C > B$  (b)  $B > C > A > D$  (c)  $C > A > B > D$  (d)  $A > B > C > D$

13. The major product and the reaction involved is



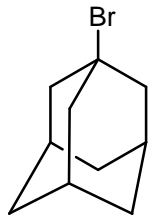
- (a)  $P =$   and N.T(I) (b)  $P =$   and N.T(II)
- (c)  $P =$   and N.T(II) (d)  $P =$   and N.T(I)



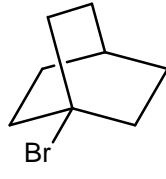
The correct relation between  $H_A$ ,  $H_B$ ,  $H_C$  and  $H_D$  are

- (a)  $H_B$  and  $H_C$  are homotopic ligand (b)  $H_D$  and  $H_C$  are homotopic ligand  
 (c)  $H_A$  and  $H_C$  are diastereotopic (d)  $H_A$  and  $H_C$  similarly  $H_D$  and  $H_B$  are enantiotopic

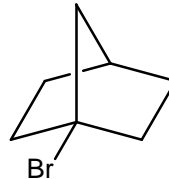
15. Arrange the rate of solvolysis of following compounds in 80% ethanol at 25°C



(I)



(II)



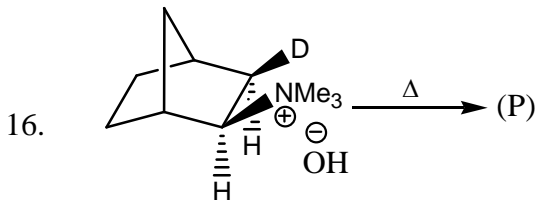
(III)

(a) I &gt; III &gt; II

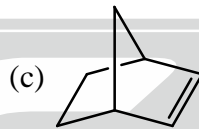
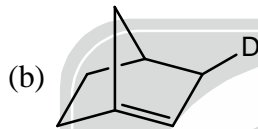
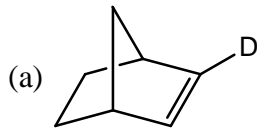
(b) II &gt; I &gt; III

(c) I &gt; II &gt; III

(d) II &gt; III &gt; I

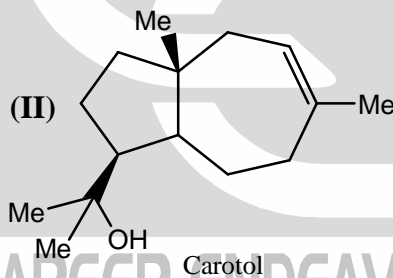
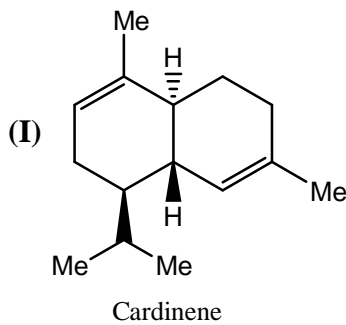


The major product (P) in the above reaction is



(d) No elimination product

17. The following structures are the examples of



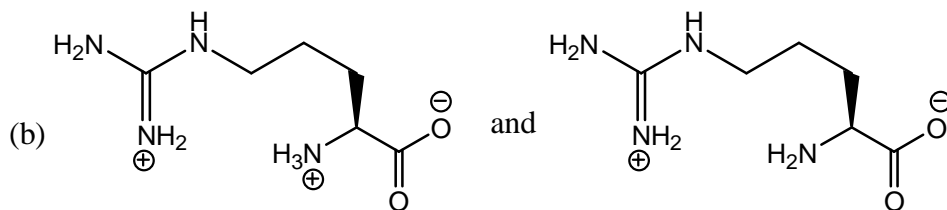
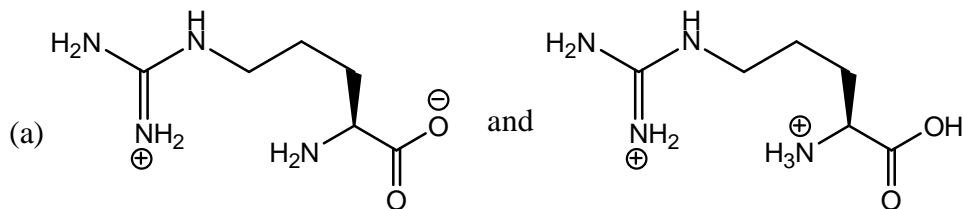
(a) (I) Sesquiterpene and (II) monoterpene

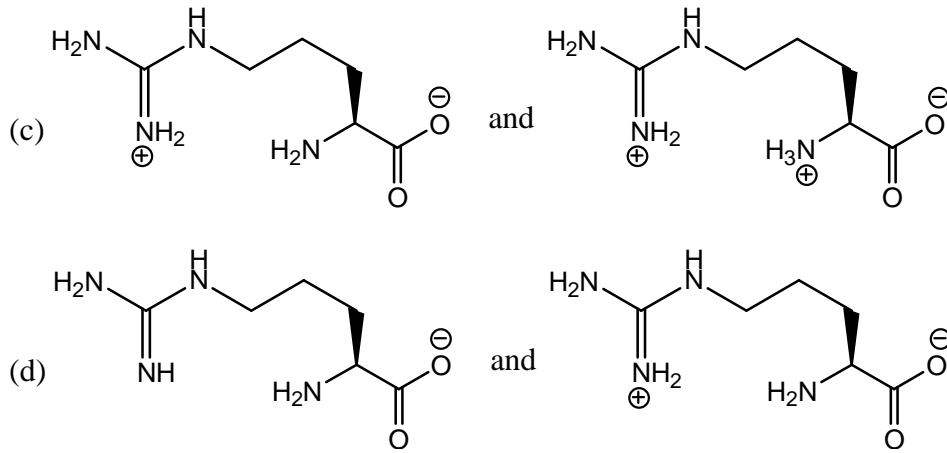
(b) (I) Sesquiterpene and Sesterterpene

(c) both are Sesquiterpenes

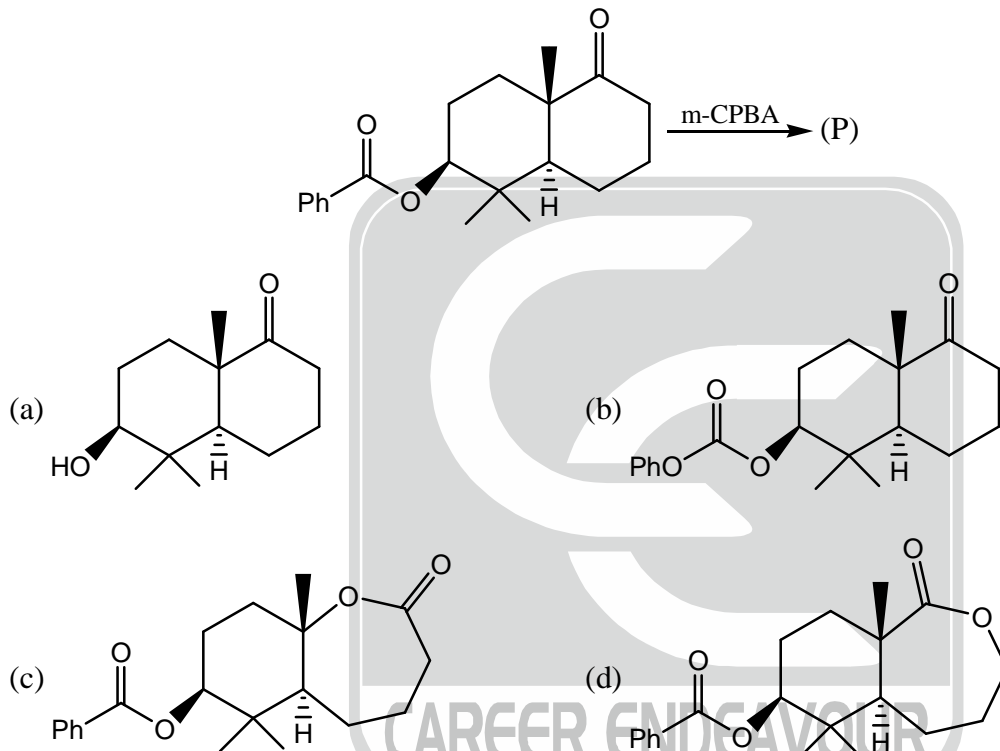
(d) Both are Sesterterpenes

18. At pH = 10.0 and pH = 5.0 which two structures of Arg are likely to be exist

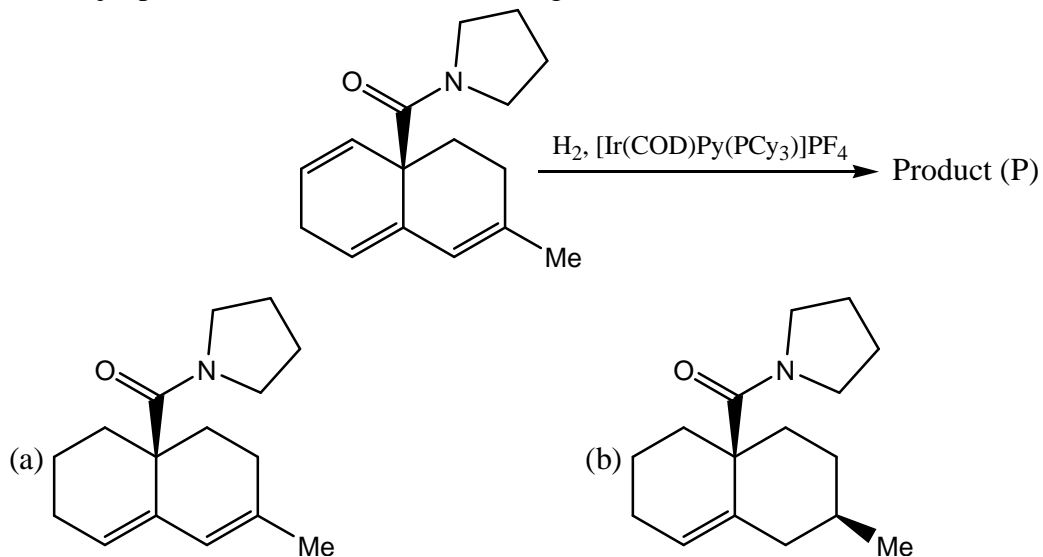




19. The major product (P) is

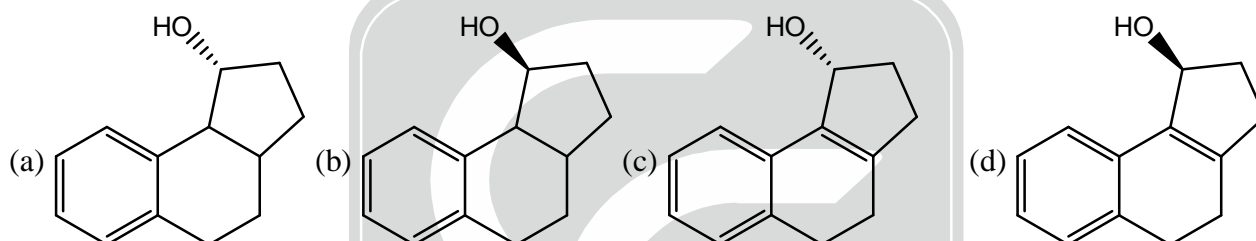
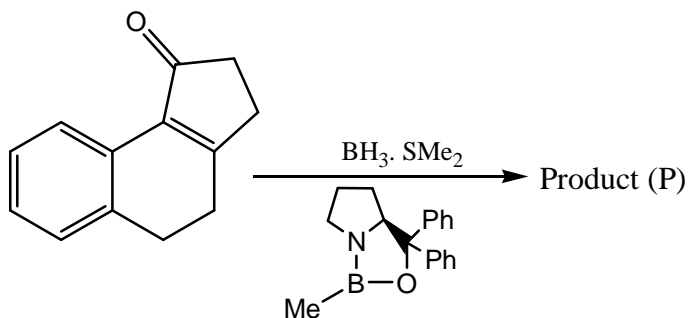


20. The major product (P) formed in the following reaction is

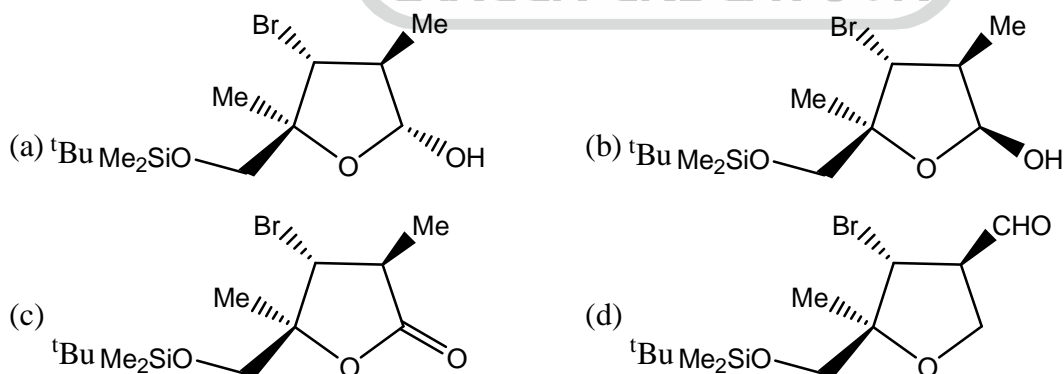
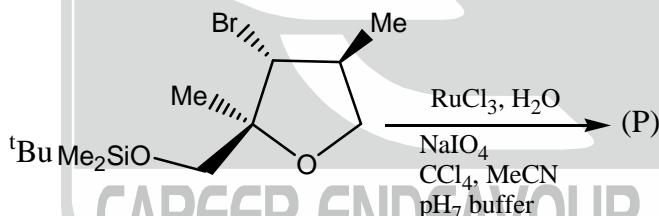




21. The major product (P) formed in the following reaction

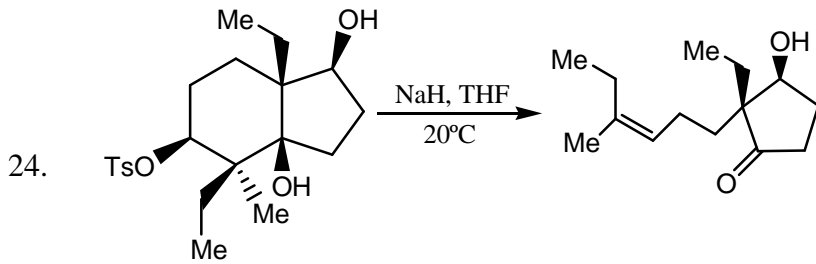


22. The product formed in the following reaction is



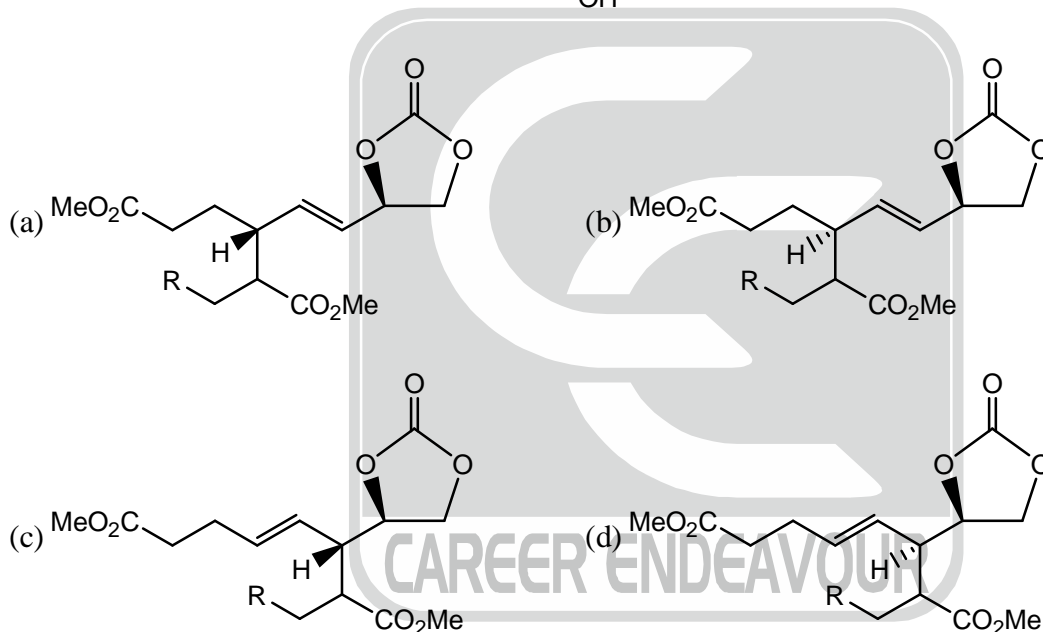
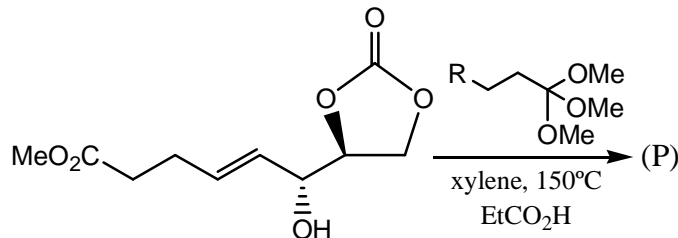
23. What will be the intensity ratio of molecular ion signal and its isotopic signal M+1 in mass spectrum of 18-annulene molecule?

- (a) 5 : 1      (b) 3 : 1      (c) 5 : 2      (d) 4 : 3



The above synthetic transformation is an example of

- (a) Peterson Olefination (b) Julia Olefination  
(c) Corey-winter synthesis (d) Grob's fragmentation
25. The major product (P) is



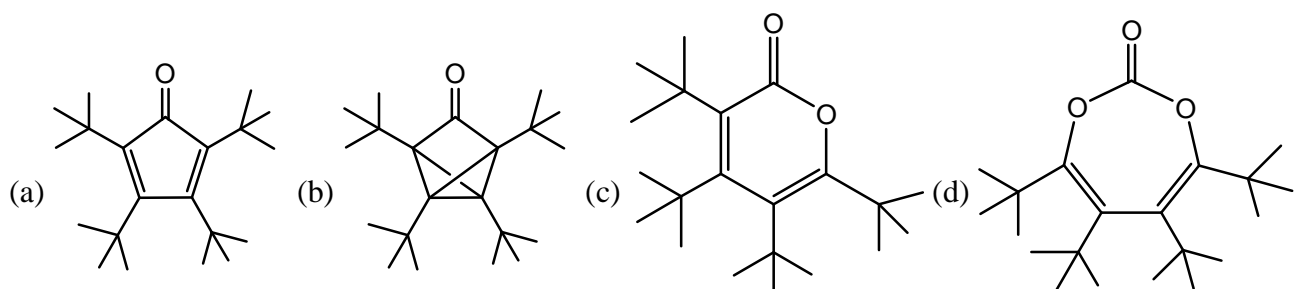
26. An organic compound exhibits the following spectral data:

IR :  $1762\text{ cm}^{-1}$

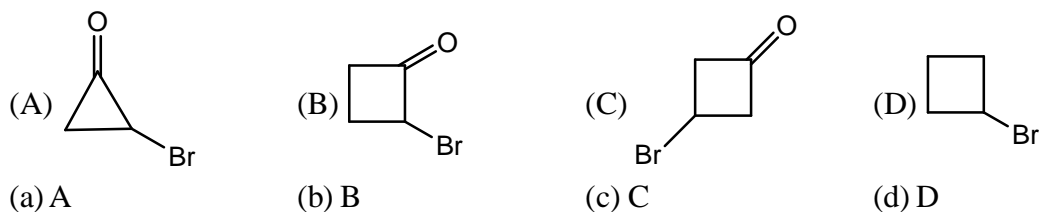
$^1\text{H NMR}$  :  $\delta 1.37(18\text{H}, s); 1.27(18\text{H}, s)$

$^{13}\text{C NMR}$  :  $\delta 188.7, 60.6, 33.2, 33.1, 31.0, 30.2, 29.3$

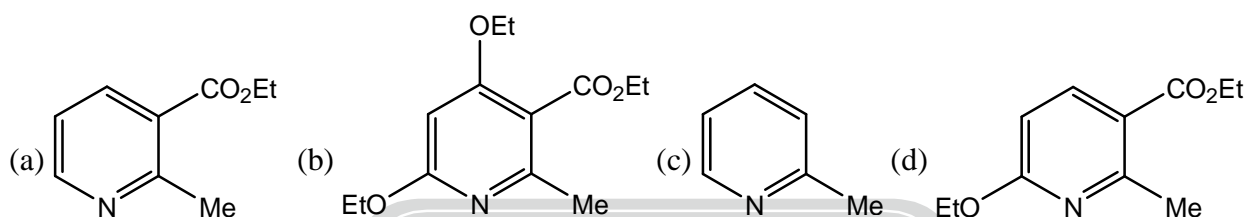
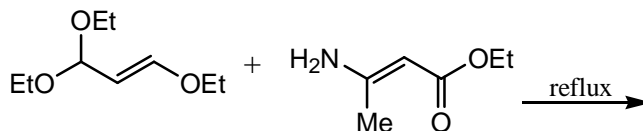
The structure of the compound is



27. Four entities A, B, C and D are subjected to elimination reaction under identical. Which among them will undergo elimination reaction readily



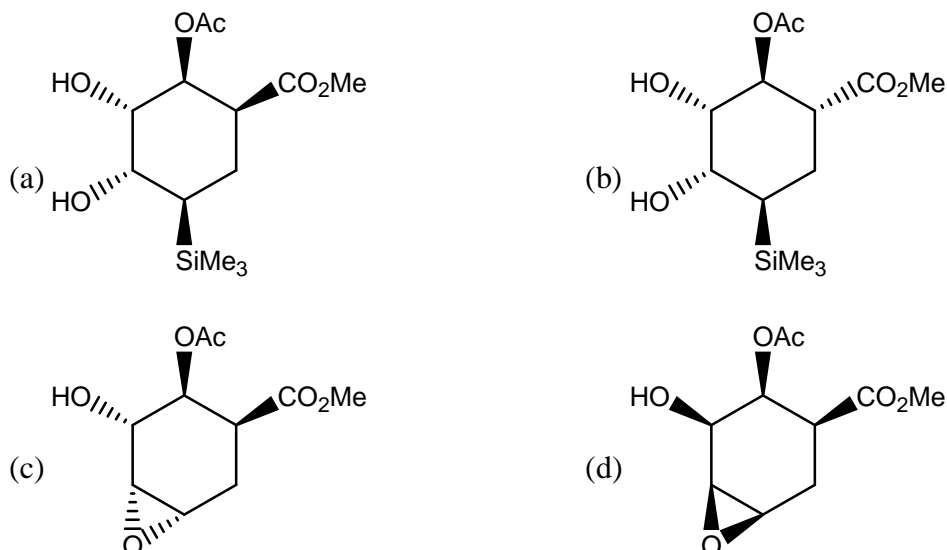
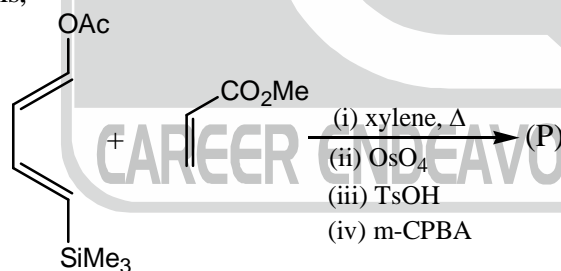
28. The major product (P) is



29. (+) - Mandelic acid has a specific rotation of  $+160^\circ$ . The observed specific rotation of a mixture of 40% (-) mandelic acid and 60% (+) -mandelic acid is  
 (a)  $-32^\circ$  (b)  $+32^\circ$  (c)  $+64^\circ$  (d)  $+26^\circ$
30. Which of the following of molecule can not give conformational isomers?  
 (a) Methylcyclopentane (b) Cis-decalin  
 (c) Cyclohexane (d) Bicyclo[2.2.1]heptane

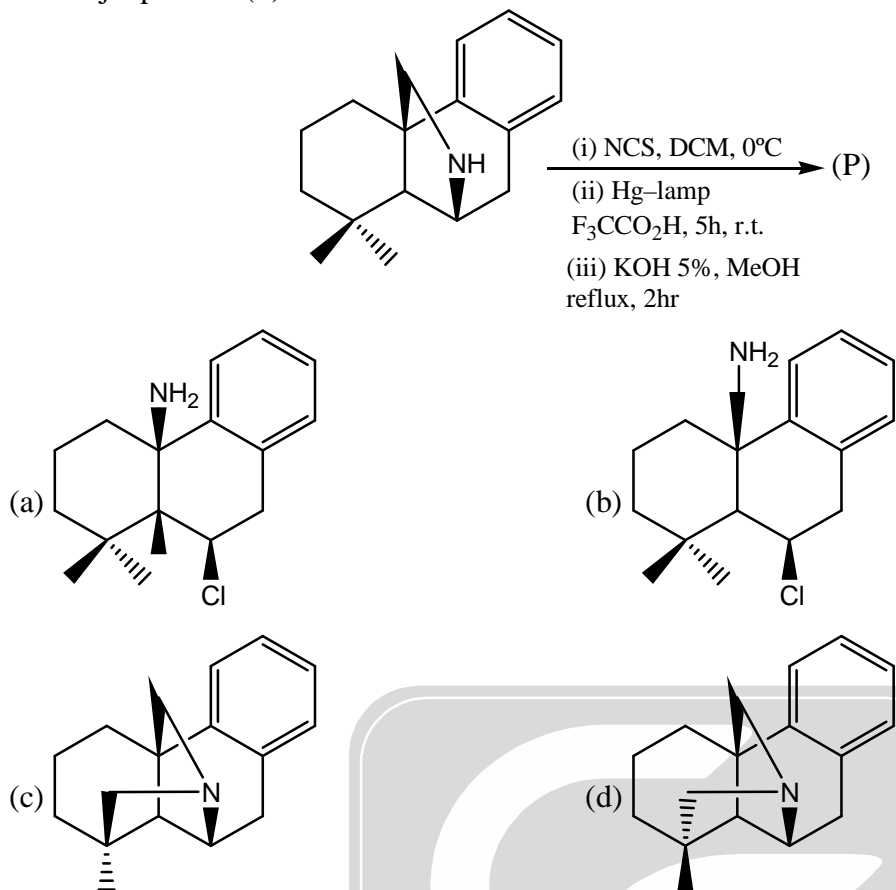
### PART - C

31. The major product (P) is,

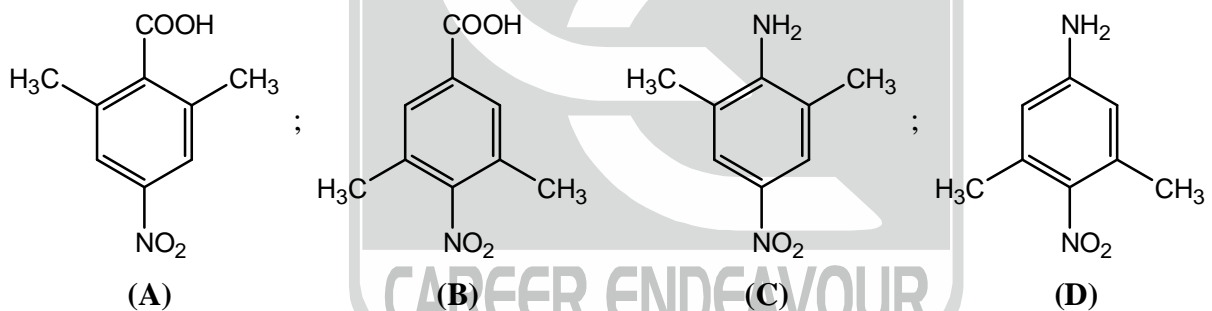




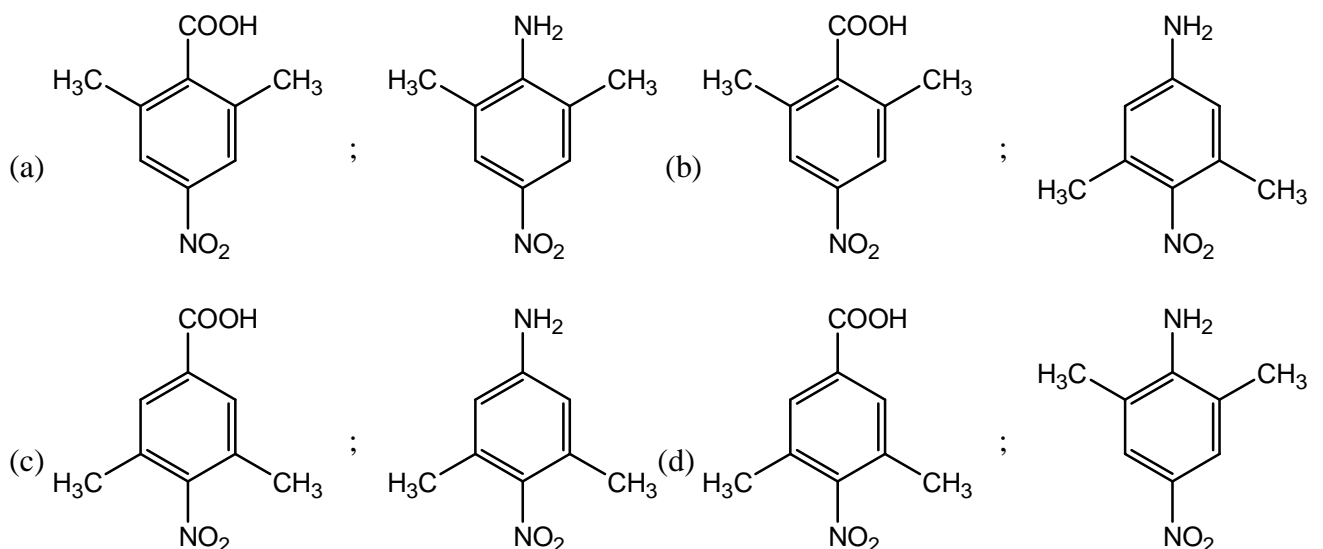
32. The major product (P) is



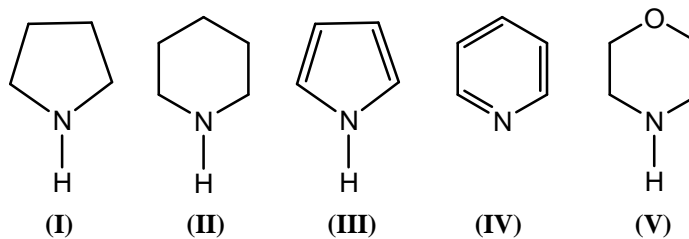
33. Consider the following pair of compounds



The most acidic compound among A and B and most basic among C and D will be

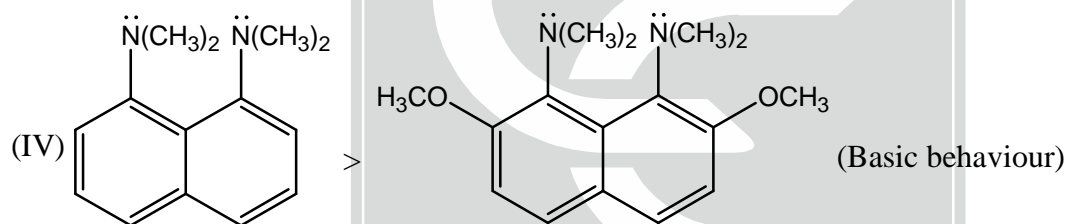
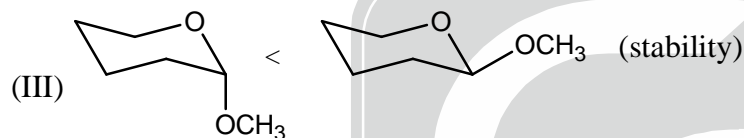
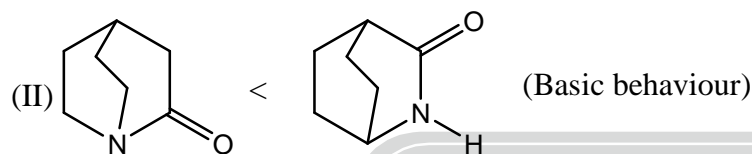
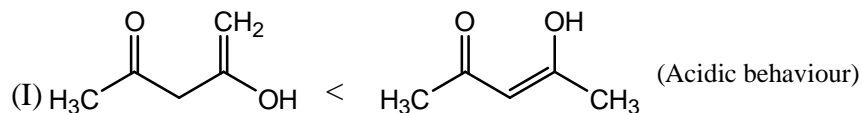


34. The reactivity of following compounds with proton will be in the order of

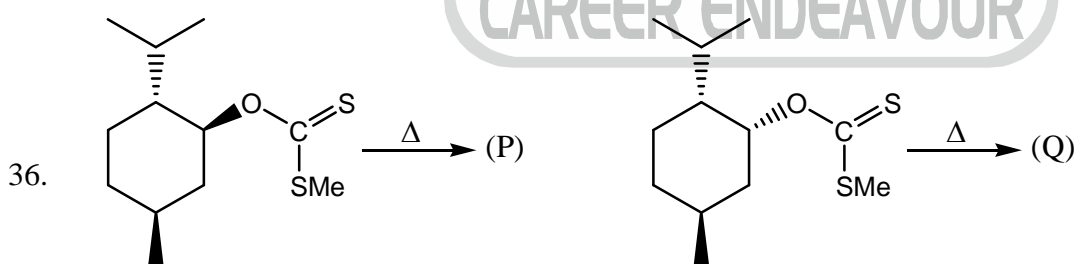


- (a) I > II > V > IV > III                                  (b) II > I > V > IV > III  
 (c) I > II > IV > V > III                                  (d) III > IV > V > II > I

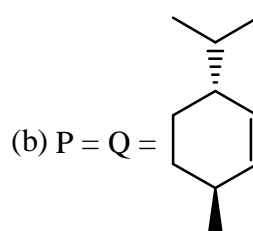
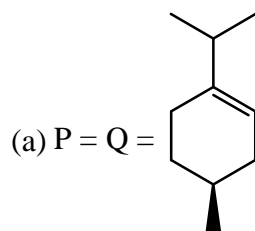
35. Choose the correct order against properties mentioned in bracket

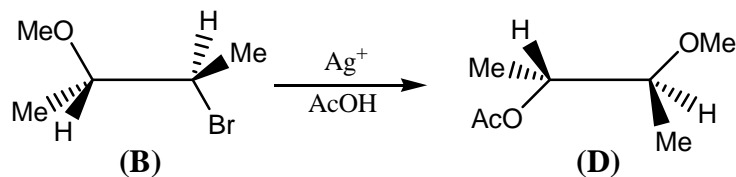
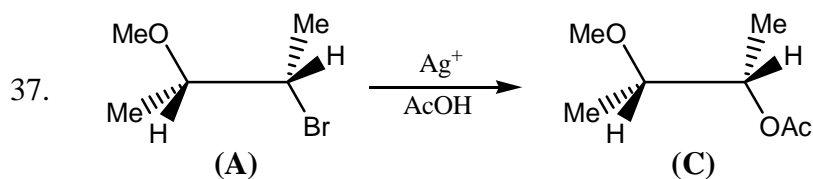
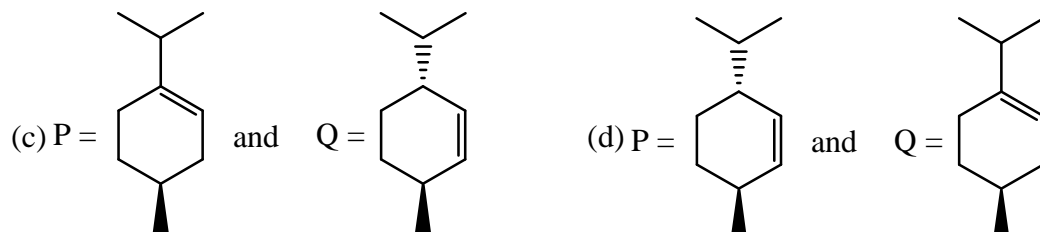


- (a) I and III are correct    (b) I, III and IV are correct  
 (c) III and IV are correct                                      (d) none of the above



The major product (P) and (Q) are respectively

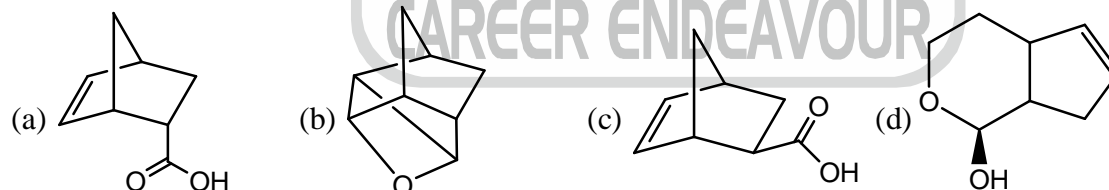
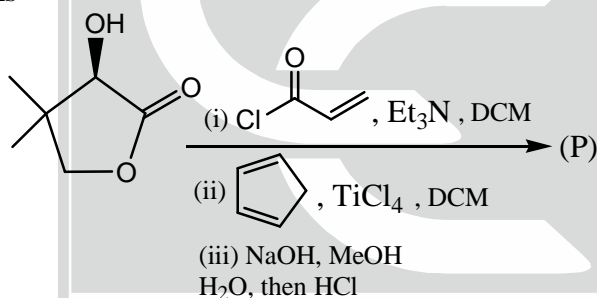




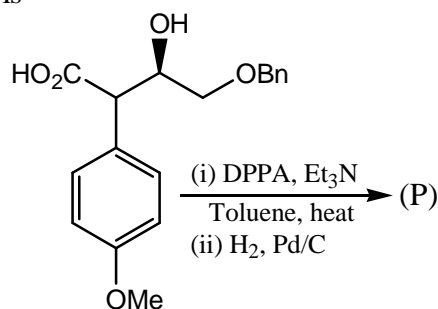
Optically pure isomer (A) and (B) were treated with silver acetate in acetic acid. The correct statement from the following is

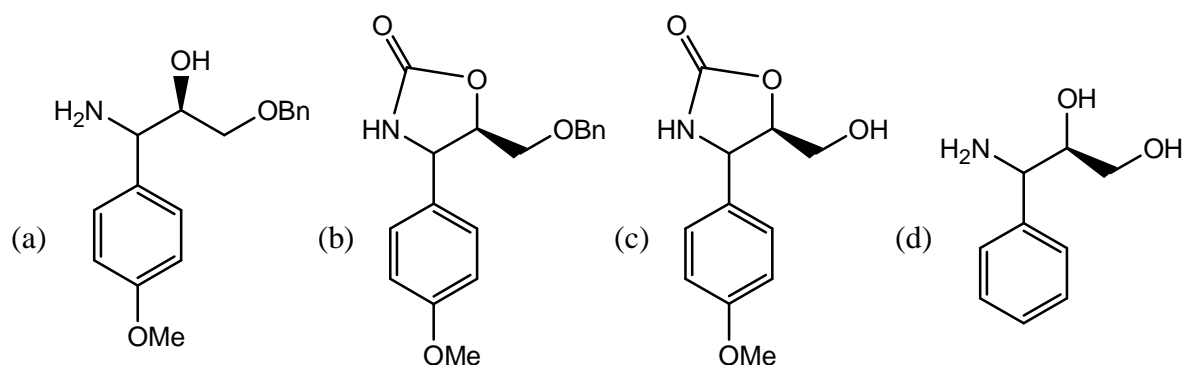
- (a) (A) gives optically pure (C)  
 (b) (A) gives optically pure (C) and (B) give optically pure (D)  
 (c) (A) gives racemic mixture of (C) and (B) gives optically pure (D)  
 (d) (B) gives racemic mixture of (D)

38. The major product (P) is

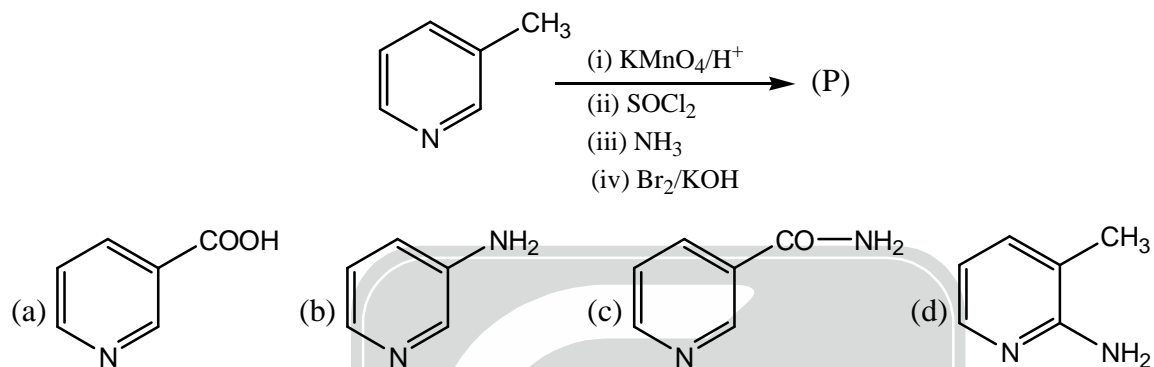


39. The major product (P) is

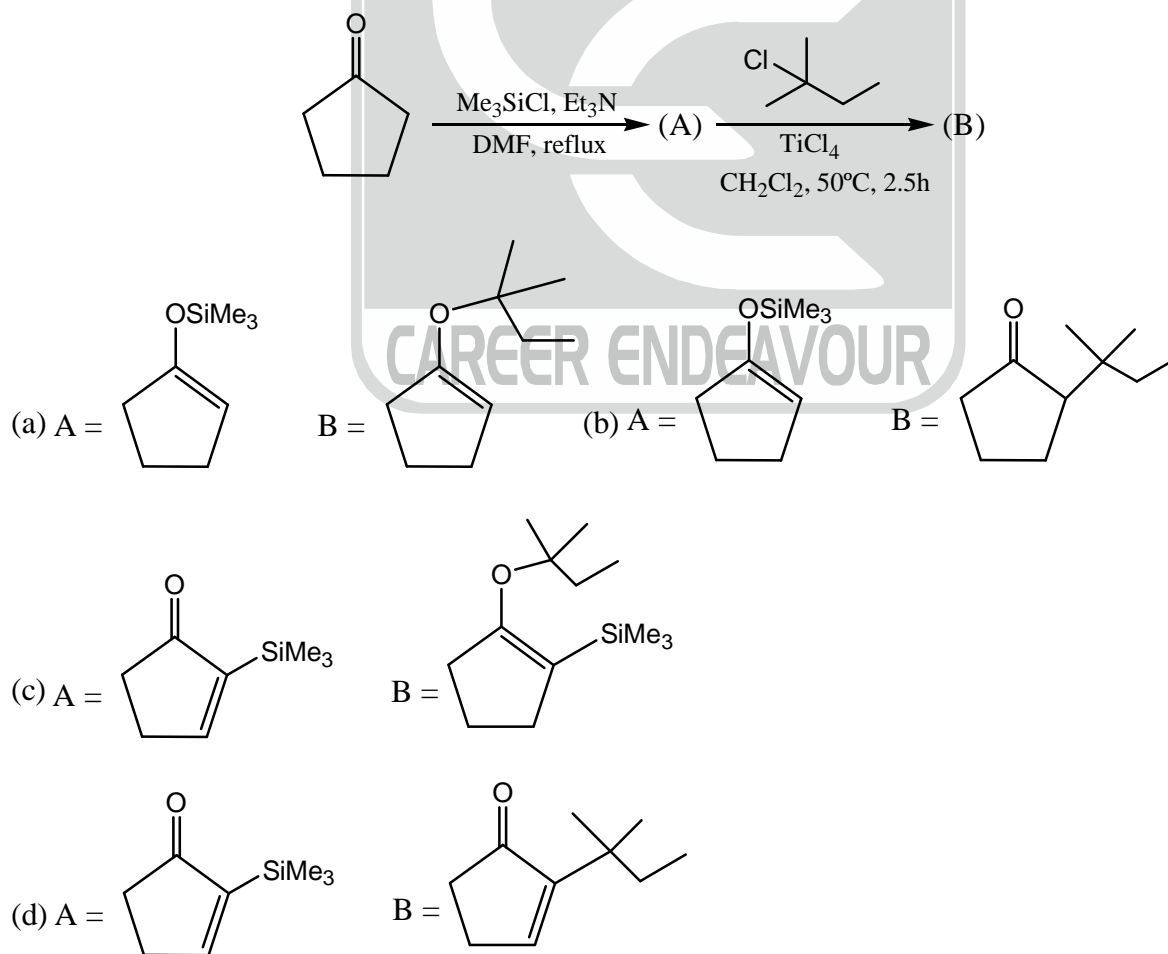




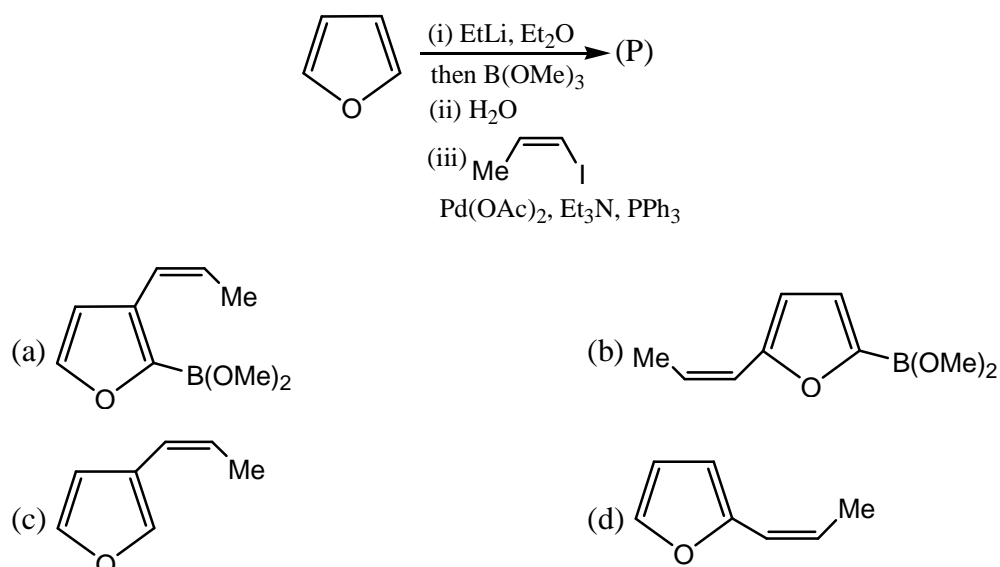
40. The major product (P) is



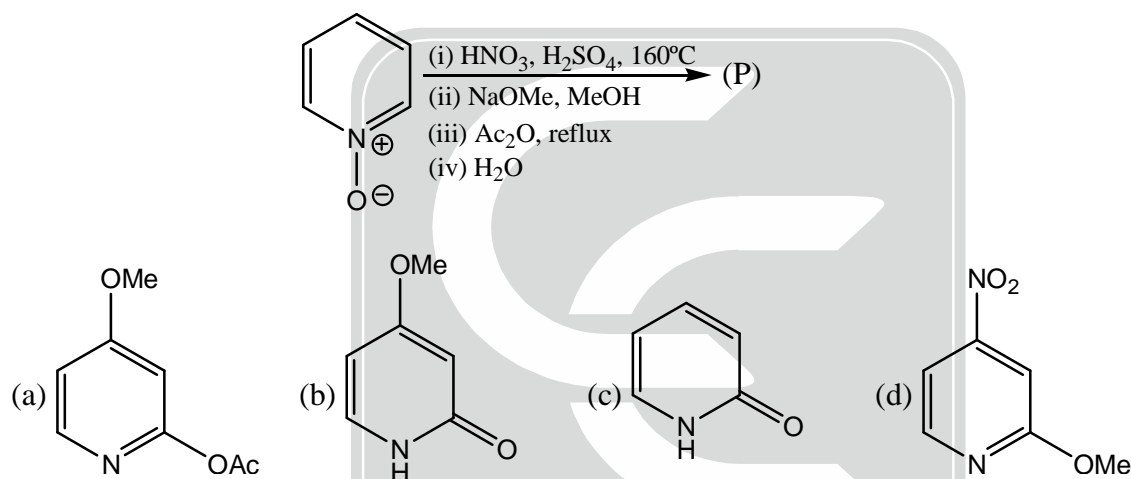
41. Products A and B in the following reaction sequence are



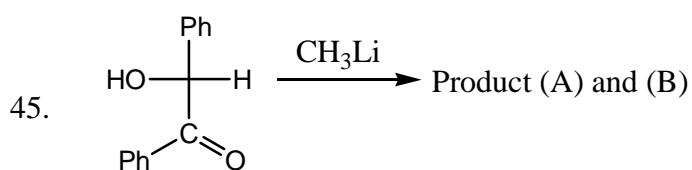
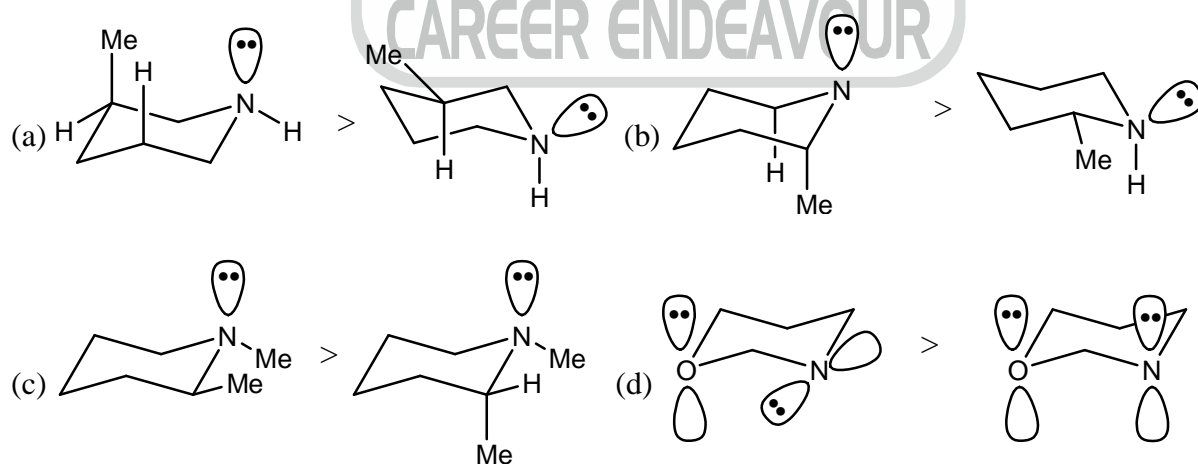
42. The major product (P) is



43. The major product (P) is



44. In the following compounds, the correct order of relative stability

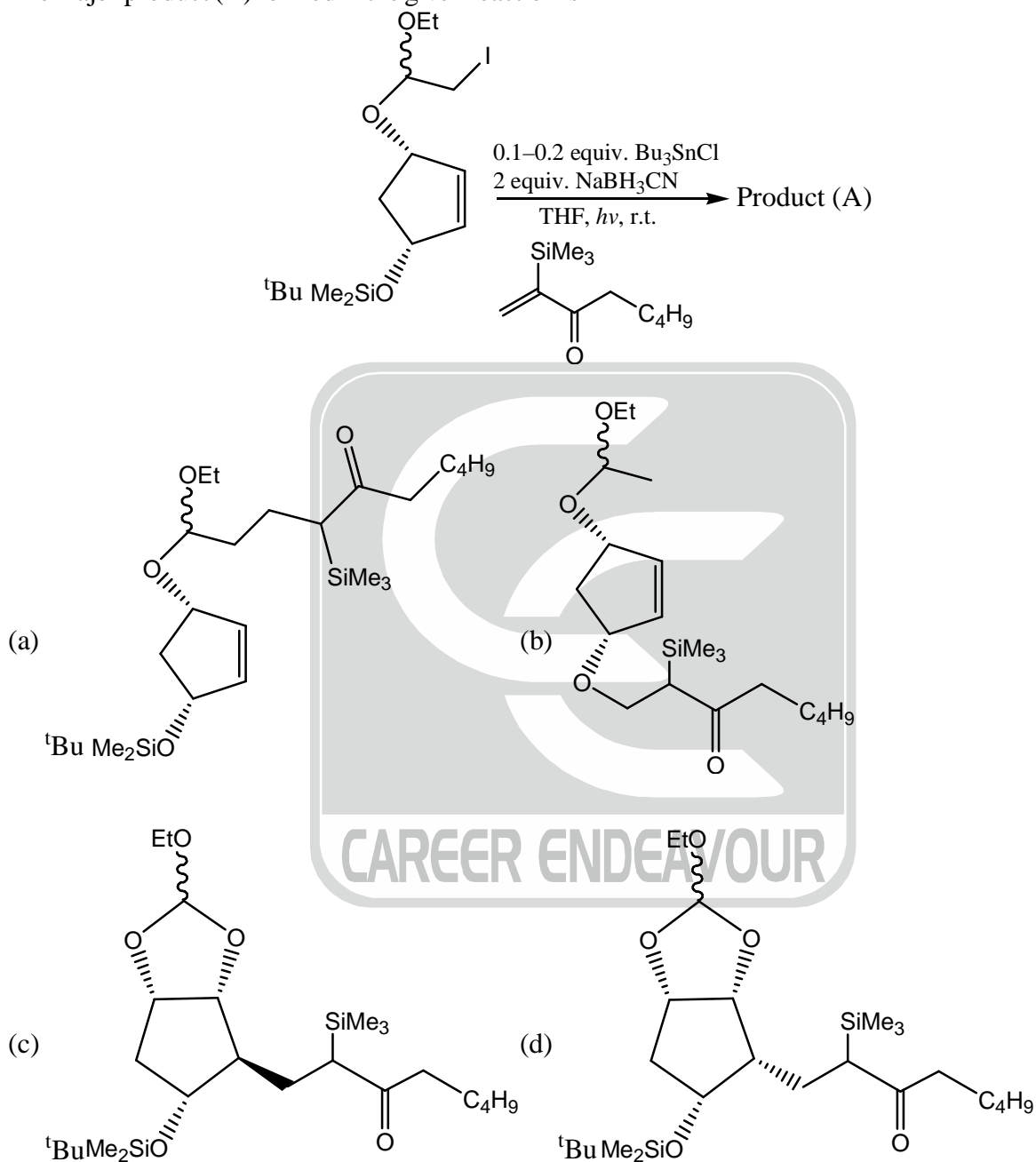


- (A) Relationship between product formed A and B are enantiomers  
 (B) Relationship between product formed A and B are diastereoisomers  
 (C) Major product formed according to Cram's rule  
 (D) Major product formed according to Anticram's rule  
 (E) Relationship between product formed A and B are homomers

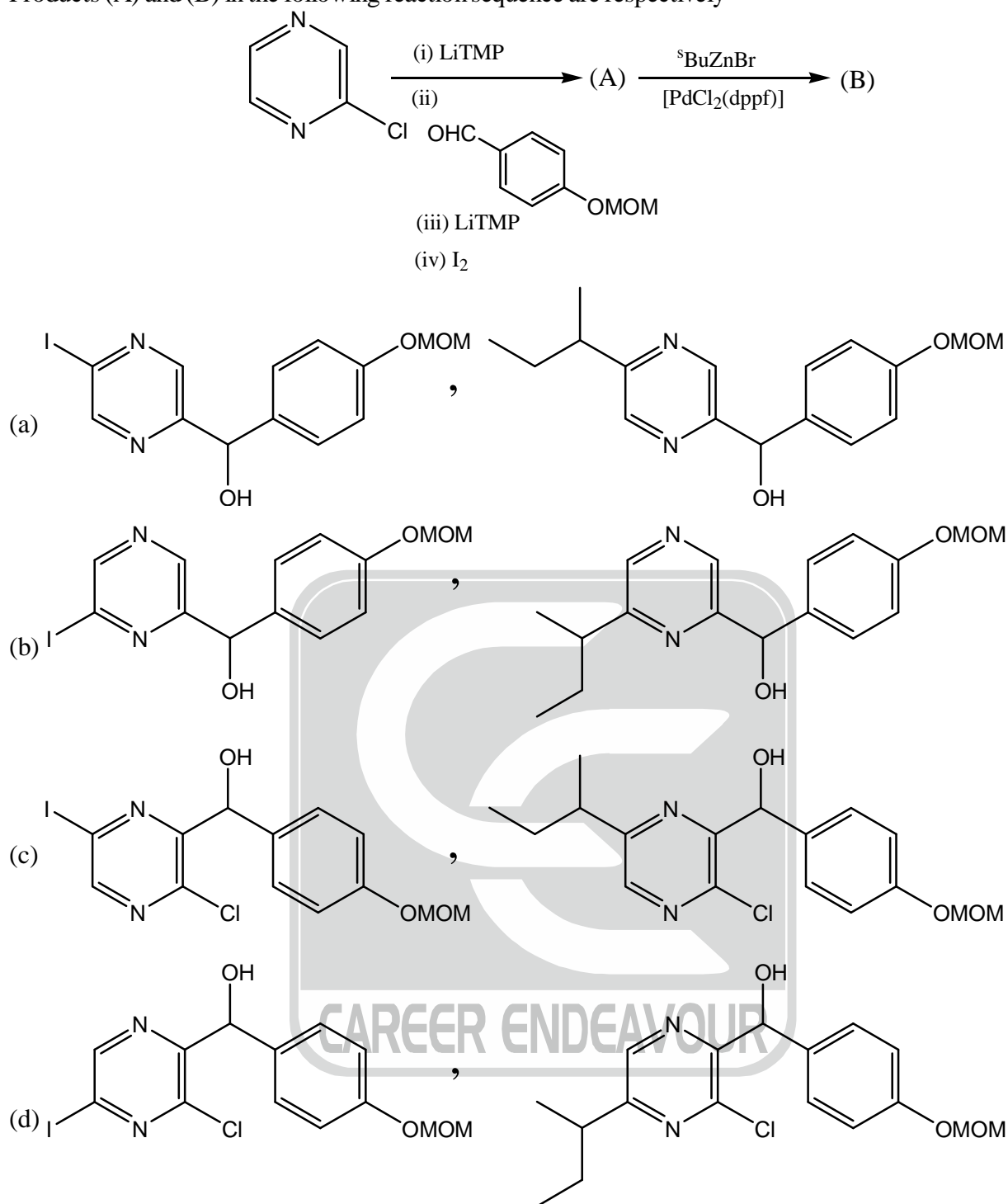
The correct statement(s) is

- (a) B, C                      (b) D, E                      (c) B, D                      (d) A, C

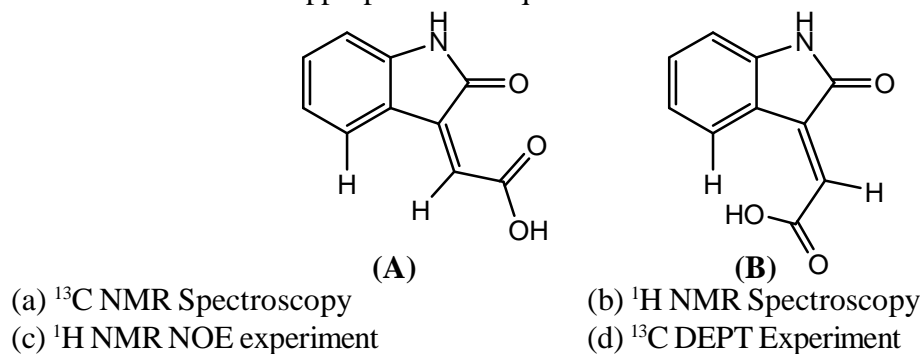
46. The major product (A) formed in the given reaction is



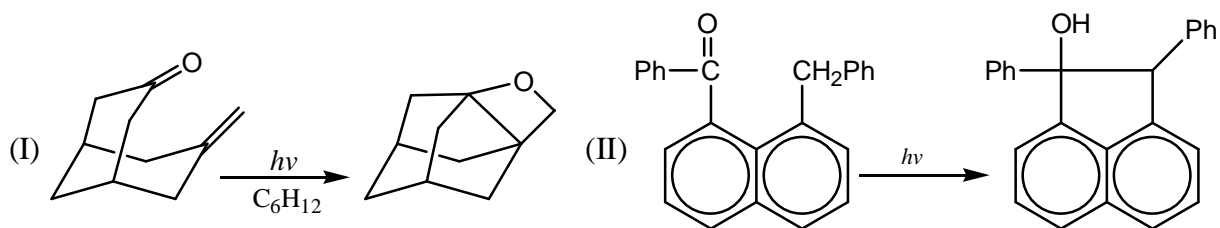
47. Products (A) and (B) in the following reaction sequence are respectively



48. Which will be the most appropriate technique to differentiate molecule A and B ?

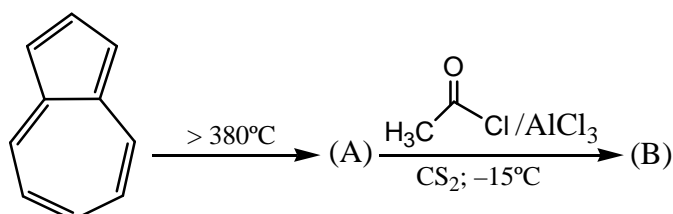


49. The following reactions are the examples of

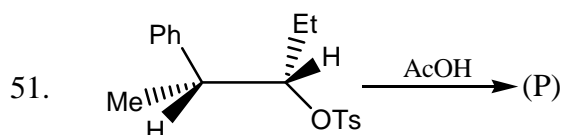
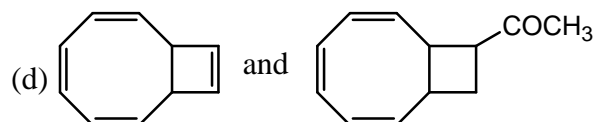
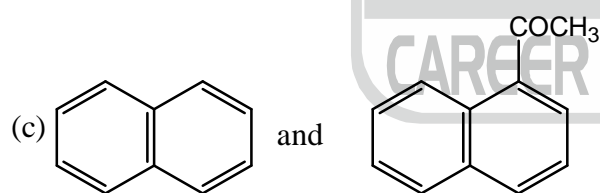
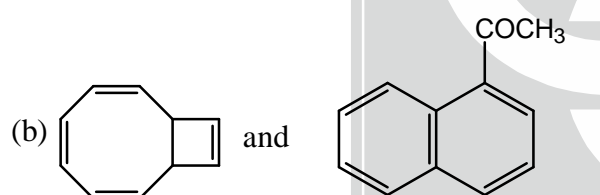
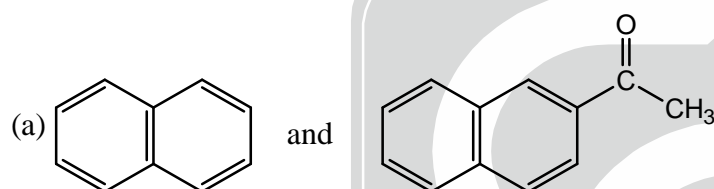


- (a) Paterno buccii and Norrish Type (I) reactions respectively  
 (b) Paterno buccii and Norrish Type (II) reactions respectively  
 (c) Norrish Type (I) and Norrish Type (II) reactions respectively  
 (d) both are Norrish Type (II)

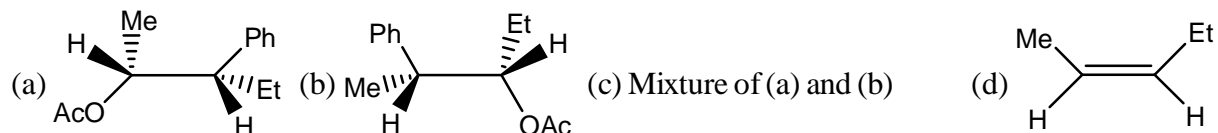
50. Consider the following reaction



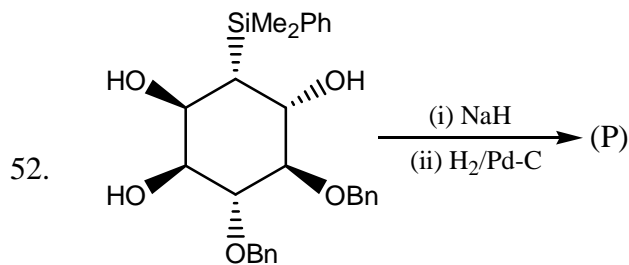
In the given reaction sequence A and B formed respectively will be



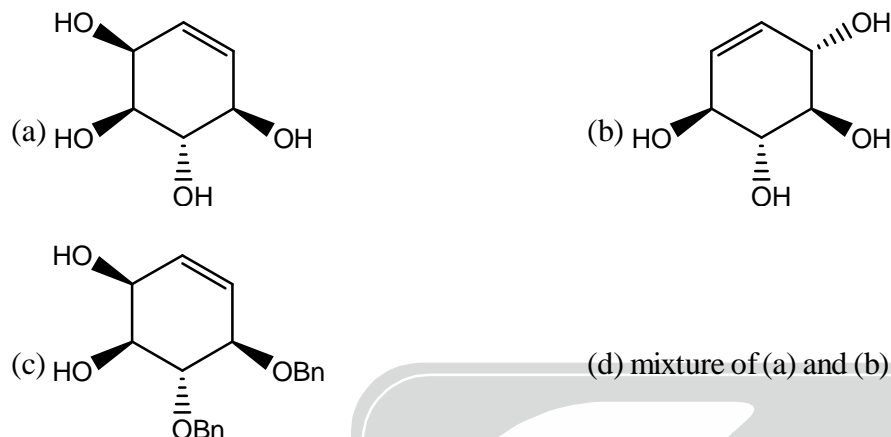
The major product (P) in the above reaction is







The major product (P) in the above reaction is



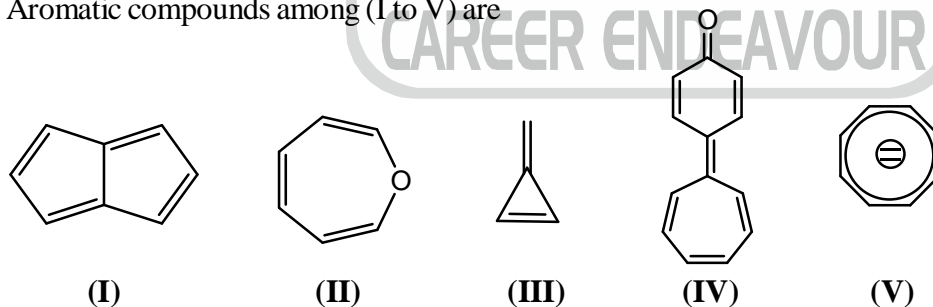
53. DNA and RNA are structurally similar in some ways but difference in others. Choose the statements which is/are correct for DNA but incorrect for RNA

- (I) DNA contains the 2-Deoxyribose sugar      (II) DNA contains pyrimidine cytosine  
 (III) DNA contains purine adenine      (III) DNA contains pyrimidine thymine
- (a) I and II      (b) I and III      (c) I and IV      (d) I only

54. Treatment of D-fructose with 5-moles of  $\text{HIO}_4$  gives

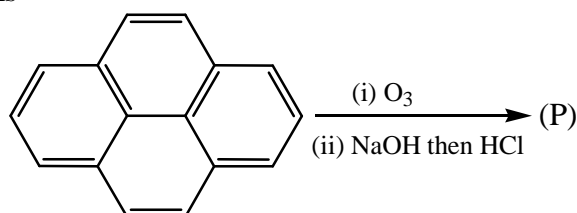
- (a) 3 moles of  $\text{HCHO}$ , 2 moles of  $\text{HCOOH}$  and one mole of  $\text{CO}_2$   
 (b) 3 moles of  $\text{HCOOH}$ , 2 moles of  $\text{HCHO}$  and one mole of  $\text{CO}_2$   
 (c) 4 moles of  $\text{HCOOH}$  and 2 moles of  $\text{HCHO}$   
 (d) 2 moles of  $\text{HCOOH}$  and 4 moles of  $\text{HCHO}$

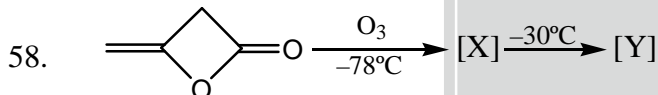
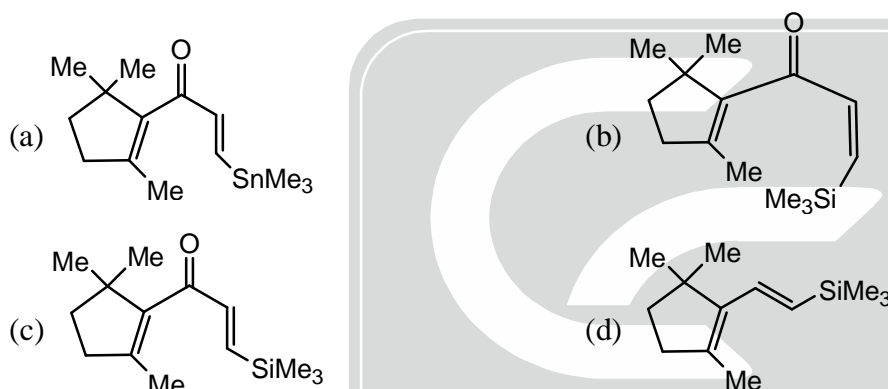
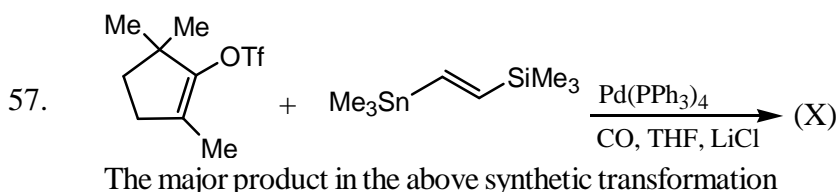
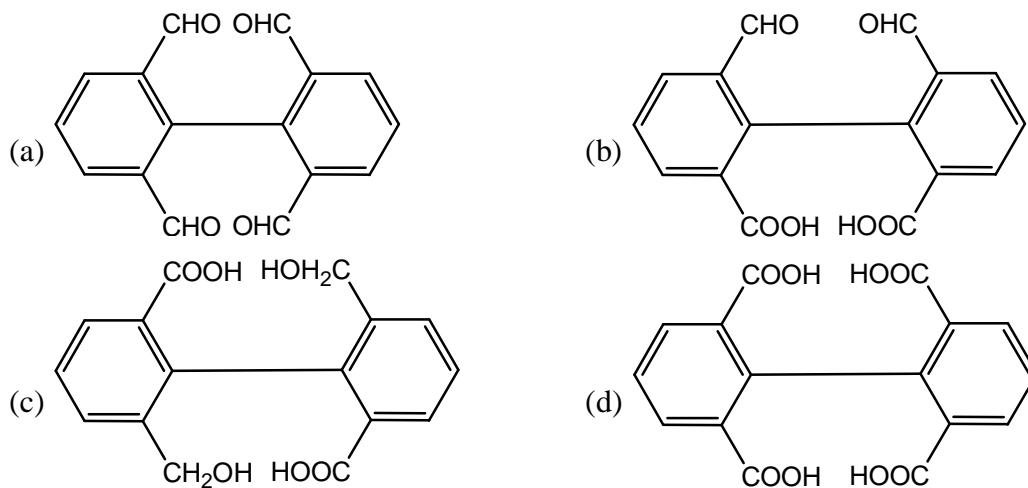
55. Aromatic compounds among (I to V) are



- (a) I, III and IV      (b) I, II and IV      (c) III and IV      (d) III, IV and V

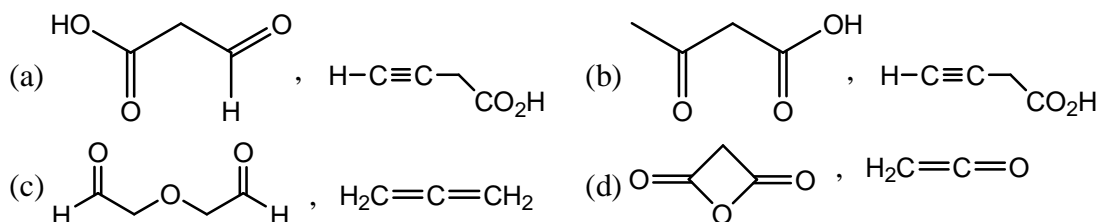
56. The major product (P) is





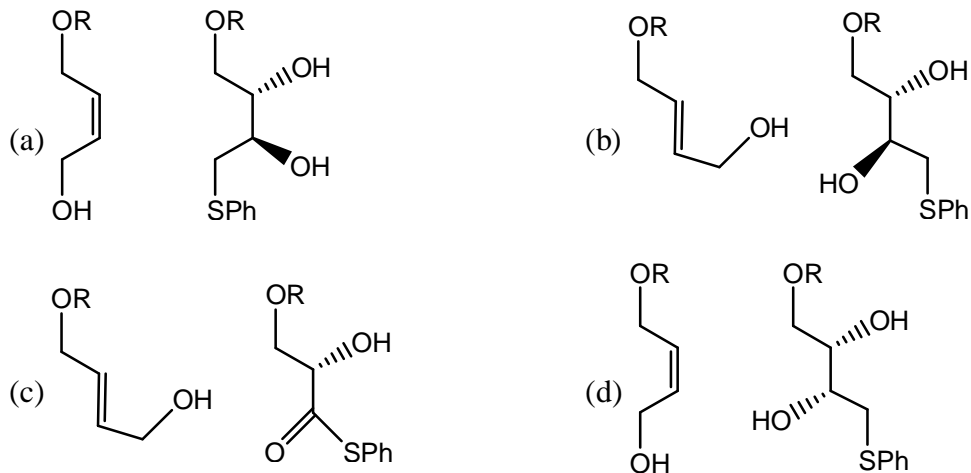
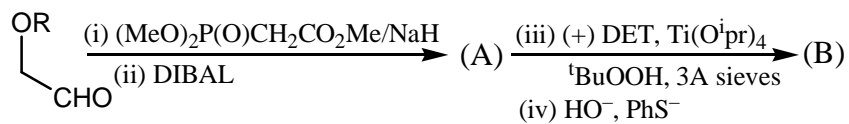
The characteristics peak in IR spectrum of compounds [X] and [Y] are given below  
 IR ( $\text{cm}^{-1}$ ); for [X] 1820, 1830  
 [Y] : 2140  $\text{cm}^{-1}$

The structure of compound [X] and [Y] are, respectively



59. An  $AX_2$  system gave 5 lines at 5.80, 5.65, 5.50, 1.15 and 1.00 ppm away from the TMS using an NMR spectrometer operating at 500 MHz. The value of  $J_{AX_2}$  (in Hz) and  $\delta_{AX_2}$  (in ppm) respectively
- (a) 0.15 Hz and 7.5 ppm  
 (b) 75 Hz and 4.575 ppm  
 (c) 45 Hz and 7.5 ppm  
 (d) 0.56 Hz and 1.5 ppm

60. The major product formed (A) and (B) are, respectively



*Space for rough work*





CHEMICAL SCIENCES

Date : 01-12-2017

TEST SERIES-C

ANSWER KEY

PART-A

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

PART-B

- |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| 11. (c) | 12. (a) | 13. (b) | 14. (d) | 15. (c) | 16. (c) | 17. (c) |
| 18. (c) | 19. (c) | 20. (d) | 21. (c) | 22. (c) | 23. (a) | 24. (d) |
| 25. (a) | 26. (b) | 27. (a) | 28. (a) | 29. (b) | 30. (d) |         |

PART-C

- |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| 31. (c) | 32. (c) | 33. (b) | 34. (a) | 35. (d) | 36. (c) | 37. (c) |
| 38. (a) | 39. (c) | 40. (b) | 41. (b) | 42. (d) | 43. (b) | 44. (d) |
| 45. (c) | 46. (c) | 47. (d) | 48. (c) | 49. (b) | 50. (c) | 51. (c) |
| 52. (a) | 53. (c) | 54. (b) | 55. (d) | 56. (c) | 57. (c) | 58. (d) |
| 59. (b) | 60. (b) |         |         |         |         |         |

