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National Testing Agency

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Organic Chemistry 1

Group Number :	1
Group Id :	512452180
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	100
Is this Group for Examiner? :	No

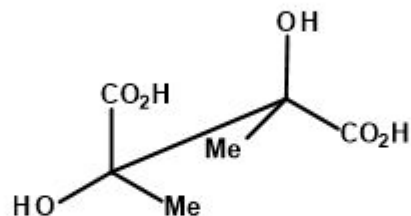
Organic Chemistry 1 -1

Section Id :	512452846
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20

Number of Questions to be attempted :	20
Section Marks :	20
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	512452917
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 51245215310 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following symmetry element is not present in the following compound. If required the molecule can be rotated.



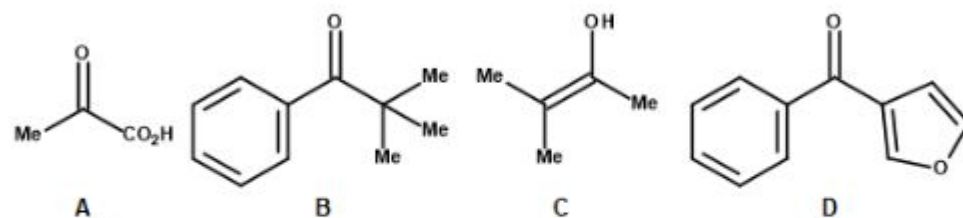
1. S_2 axis
2. Center of symmetry
3. C_4 axis of symmetry
4. C_2 axis perpendicular to C_3 axis

Options :

- 51245248553. 1
- 51245248554. 2
- 51245248555. 3
- 51245248556. 4

Question Number : 2 Question Id : 51245215311 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Identify which of the following compound(s) can form keto-enol tautomers



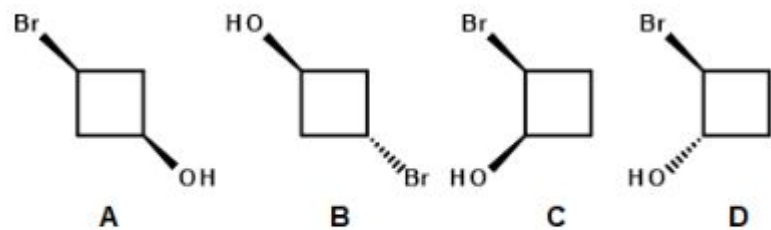
1. A only
2. A and C only
3. B only
4. B and D only

Options :

- 51245248557. 1
- 51245248558. 2
- 51245248559. 3
- 51245248560. 4

Question Number : 3 Question Id : 51245215312 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following compound(s) is/are chiral



1. A only
2. C only
3. C and D only
4. A and B only

Options :

- 51245248561. 1
- 51245248562. 2
- 51245248563. 3
- 51245248564. 4

Question Number : 4 Question Id : 51245215313 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Match the following

Species	Number of e ⁻
(P) carbanion	(i) six
(Q) carbene	(ii) seven
(R) proton	(iii) eight
(S) carbon free radical	(iv) two
(T) hydride ion	(v) zero

1. (P)-(iii), (Q)-(ii), (R)- (iv), (S) – (i), (T)-(v)
2. (P)-(ii), (Q)-(i), (R)- (v), (S) – (iii), (T)-(iv)
3. (P)-(iii), (Q)-(i), (R)-(v), (S)- (ii), (T)-(iv)
4. (P)-(i), (Q)-(ii), (R)- (v), (S) – (iii), (T)-(iv)

Options :

51245248565. 1
51245248566. 2
51245248567. 3
51245248568. 4

Question Number : 5 Question Id : 51245215314 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statement is not correct

1. Hydroxide ion is a strong nucleophile and a strong base
2. Sodium hydride is a weak nucleophile and a strong base
3. Water is a weak nucleophile and a strong base
4. Cyanide ion is a strong nucleophile and a weak base

Options :

- 51245248569. 1
- 51245248570. 2
- 51245248571. 3
- 51245248572. 4

Question Number : 6 Question Id : 51245215315 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The Hammett equation is not applicable for which of the following type of reactions

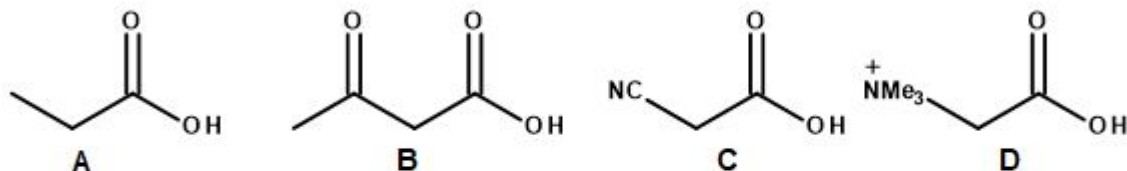
1. hydrolysis of *para* and *meta* substituted methyl benzoates
2. halogen exchange of *para* and *meta* substituted benzene derivatives
3. nitration of aromatic system (*meta* and *para* substituted system)
4. hydrolysis of *ortho* substituted methyl benzoates

Options :

- 51245248573. 1
- 51245248574. 2
- 51245248575. 3
- 51245248576. 4

Question Number : 7 Question Id : 51245215316 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Arrange the compounds according to the increasing order of acidity of the carboxylic acid proton



1. $A < B < C < D$
2. $B < A < C < D$
3. $B < C < A < D$
4. $A < B < D < C$

Options :

- 51245248577. 1
- 51245248578. 2
- 51245248579. 3
- 51245248580. 4

Question Number : 8 Question Id : 51245215317 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following reaction is not generally used for polycyclic aromatic hydrocarbon synthesis

1. Diels-Alder reaction
2. Ring closing metathesis
3. Aromatic nucleophilic substitution
4. [3+3] annulation

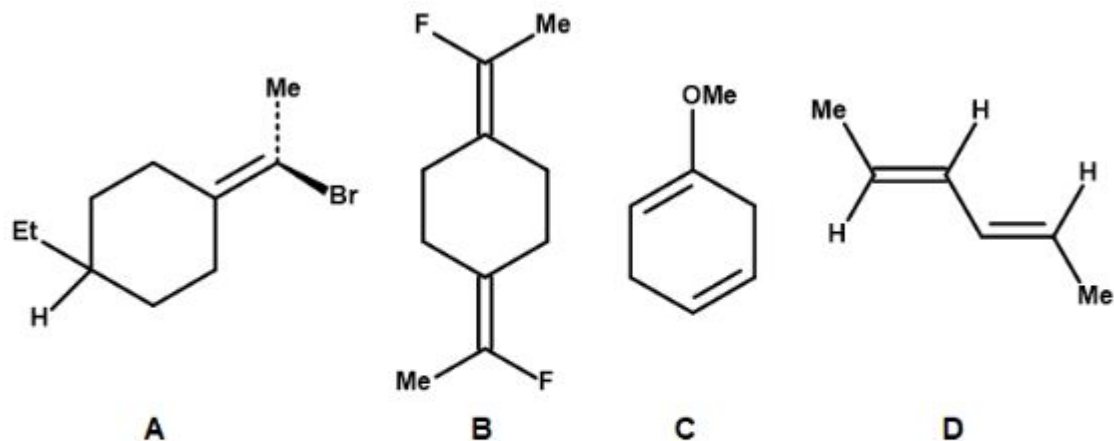
Options :

- 51245248581. 1
- 51245248582. 2
- 51245248583. 3
- 51245248584. 4

Question Number : 9 Question Id : 51245215318 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Which of the following compound(s) will rotate plane polarised light



1. B and C only
2. A only
3. D only
4. C only

Options :

- 51245248585. 1
- 51245248586. 2
- 51245248587. 3
- 51245248588. 4

Question Number : 10 Question Id : 51245215319 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Match the predominant species under the conditions given

Species	Condition
(A) Water	(i) Enol
(B) Sodium hydroxide	(ii) Ketone
(C) Sodamide	(iii) Enolate

Choose the **correct** answer from the options given below:

1. (A)-(i), (B)-(ii), (C)- (iii)
2. (A)-(ii), (B)-(ii) and (iii), (C)- (iii)
3. (A)-(i) and (ii), (B)-(i) and (iii), (C)- (iii)
4. (A)-(i), (B)-(i) and (ii), (C)- (iii)

Options :

51245248589. 1
51245248590. 2
51245248591. 3
51245248592. 4

Question Number : 11 Question Id : 51245215320 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statement is not true for aldol reaction between an aldehyde and a ketone

1. tautomerization of the ketone to form the enol (can act as a nucleophile)
2. protonation of the aldehyde (can act as an electrophile)
3. can be catalysed by acids or bases
4. can only be catalysed by strong bases

Options :

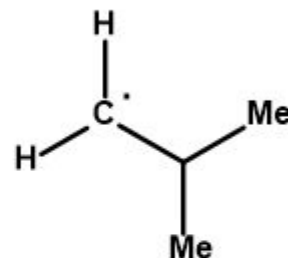
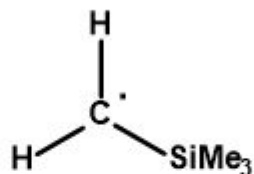
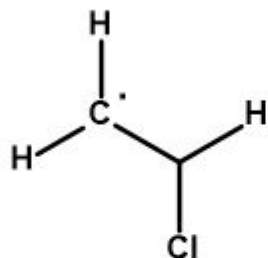
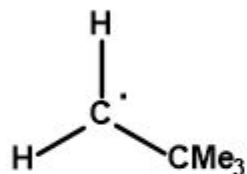
51245248593. 1
51245248594. 2

51245248595. 3

51245248596. 4

Question Number : 12 Question Id : 51245215321 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The correct stability order of following free radicals are



1. C > A > D > B
2. D > C > B > A
3. A > C > D > B
4. D > B > A > C

Options :

51245248597. 1

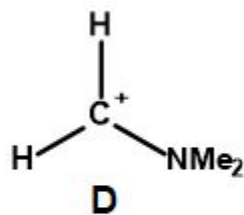
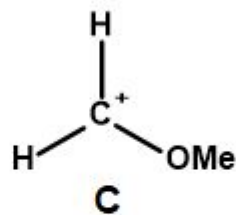
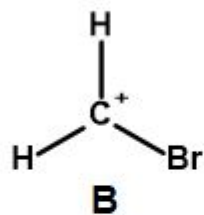
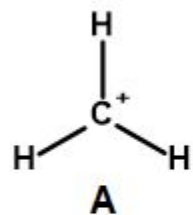
51245248598. 2

51245248599. 3

51245248600. 4

Question Number : 13 Question Id : 51245215322 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which is the least stable carbocations



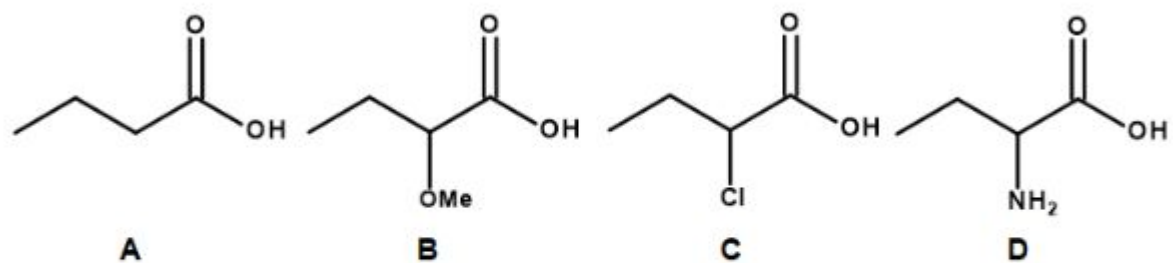
1. D only
2. B only
3. C only
4. A only

Options :

51245248601. 1
51245248602. 2
51245248603. 3
51245248604. 4

Question Number : 14 Question Id : 51245215323 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following order with respect to acid strength is correct



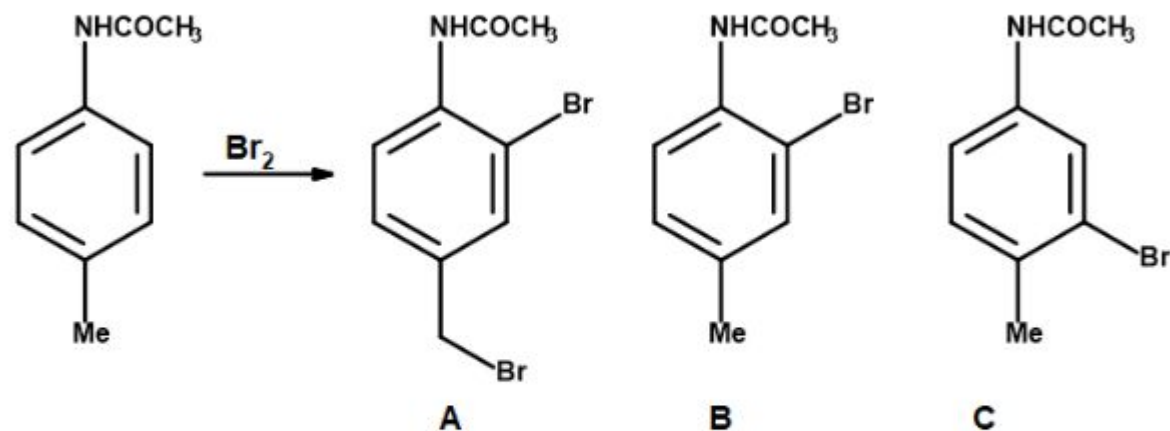
1. C > B > D > A
2. B ≈ C > D > A
3. B > C > D > A
4. D > B > A > C

Options :

51245248605. 1
51245248606. 2
51245248607. 3
51245248608. 4

Question Number : 15 Question Id : 51245215324 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Identify the product(s) for the following transformation



1. B only
2. B as major and C as minor
3. B as minor and C as major
4. A, B and C

Options :

51245248609. 1
51245248610. 2
51245248611. 3
51245248612. 4

Question Number : 16 Question Id : 51245215325 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statement regarding Diels-Alder reaction is not correct

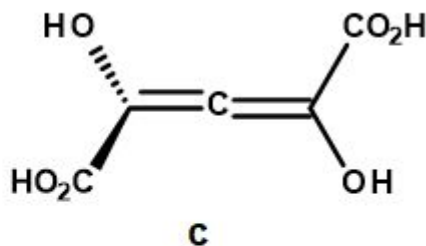
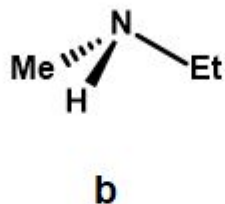
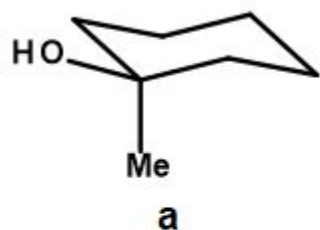
1. The diene should have *s-cis* conformation
2. EWG on dienophile decreases the reaction rate
3. The stereochemistry of the dienophile is conserved
4. When *endo* and *exo* products are possible *endo* is preferred

Options :

- 51245248613. 1
- 51245248614. 2
- 51245248615. 3
- 51245248616. 4

Question Number : 17 Question Id : 51245215326 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following compound(s) is/are optically active



- 1. a only
- 2. b only
- 3. c only
- 4. b and c

Options :

- 51245248617. 1
- 51245248618. 2
- 51245248619. 3
- 51245248620. 4

Question Number : 18 Question Id : 51245215327 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statement is not true for aromaticity criteria

1. According to Hückel theory, system with ground state singlet $(4n + 2)$ π electron is aromatic
2. According to Hückel theory, system with excited state triplet $(4n)$ π electron is aromatic
3. According to Möbius theory, system with ground state singlet $(4n)$ π electron is aromatic
4. According to Möbius theory, system with excited state triplet $(4n)$ π electron is aromatic

Options :

- 51245248621. 1
- 51245248622. 2
- 51245248623. 3
- 51245248624. 4

Question Number : 19 Question Id : 51245215328 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following arrangement of basic strength represents experimentally observed phenomenon

- A. Sodium amide (NaNH_2)
- B. Lithium diisopropyl amide (LDA)
- C. Diisopropylethyl amine (DIPEA)
- D. Sodium hydride (NaH)

1. $A > B > D > C$
2. $A > B \approx D > C$
3. $A \approx B > D > C$
4. $D > B > A > C$

Options :

- 51245248625. 1
- 51245248626. 2
- 51245248627. 3
- 51245248628. 4

Question Number : 20 Question Id : 51245215329 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Which of the following is π acceptor or π donor and σ neutral

1. Vinyl
2. Acetyl
3. Cyano
4. Alkyl

Options :

51245248629. 1

51245248630. 2

51245248631. 3

51245248632. 4

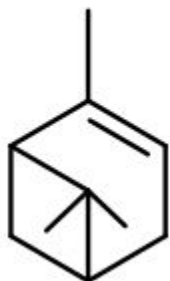
Organic Chemistry 1 -2

Section Id :	512452847
Section Number :	2
Section type :	Offline
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
Section Marks :	30
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	512452918
Question Shuffling Allowed :	No

Question Number : 21 Question Id : 51245215330 Question Type : SUBJECTIVE

Correct Marks : 3

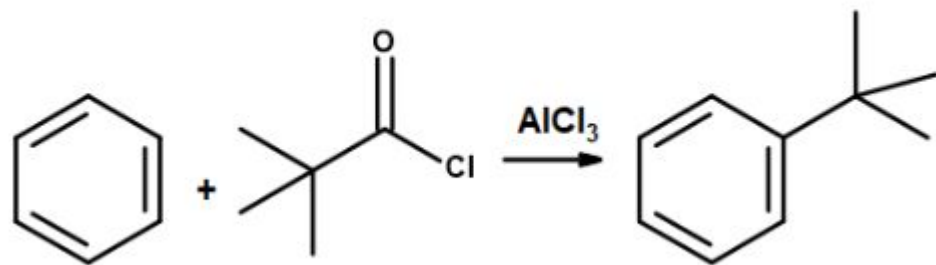
Using α -pinene as an example show that ring strain is more unstable compared to degree of substitution on carbocation mechanism.



Question Number : 22 Question Id : 51245215331 Question Type : SUBJECTIVE

Correct Marks : 3

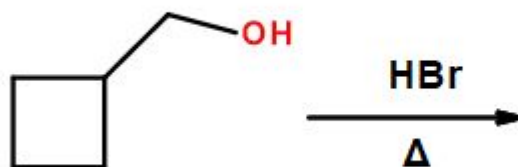
With suitable mechanism explain the product formation.



Question Number : 23 Question Id : 51245215332 Question Type : SUBJECTIVE

Correct Marks : 3

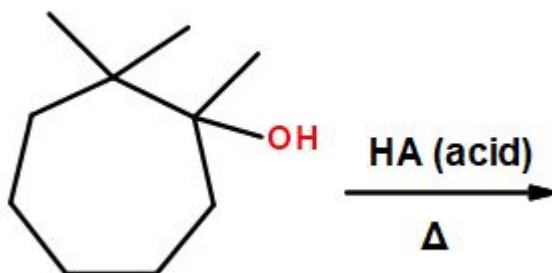
Explain the ring expansion through proper mechanism.



Question Number : 24 Question Id : 51245215333 Question Type : SUBJECTIVE

Correct Marks : 3

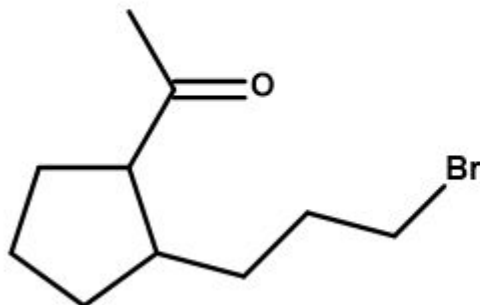
Identify the product obtained in the ring contraction.



Question Number : 25 Question Id : 51245215334 Question Type : SUBJECTIVE

Correct Marks : 3

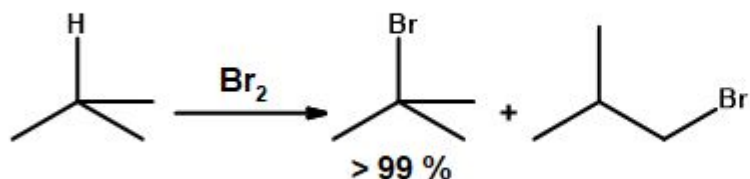
For the following substrate, identify the appropriate bases that will lead to thermodynamic product and draw the mechanism for the same.



Question Number : 26 Question Id : 51245215335 Question Type : SUBJECTIVE

Correct Marks : 3

Using reaction coordinate diagram, explain the product ratio in the following reaction.



Question Number : 27 Question Id : 51245215336 Question Type : SUBJECTIVE

Correct Marks : 3

Compare enamines, enolates. Bring out the advantages of these species.

Question Number : 28 Question Id : 51245215337 Question Type : SUBJECTIVE

Correct Marks : 3

Compare singlet and triplet carbenes.

Question Number : 29 Question Id : 51245215338 Question Type : SUBJECTIVE

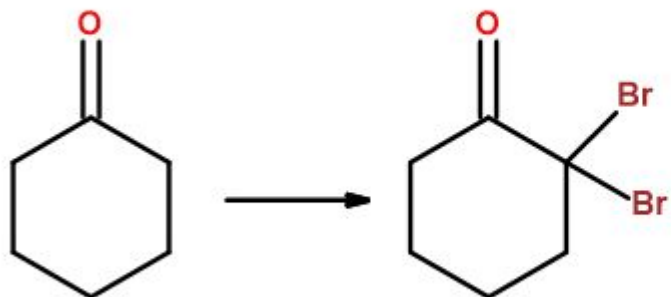
Correct Marks : 3

What is Yukawa-Tsuno equation. Under what conditions this equation is used.

Question Number : 30 Question Id : 51245215339 Question Type : SUBJECTIVE

Correct Marks : 3

Identify the reagents, reaction condition and write a suitable mechanism for the following reaction.



Organic Chemistry 1 -3

Section Id :	512452848
Section Number :	3
Section type :	Offline
Mandatory or Optional :	Mandatory
Number of Questions :	7
Number of Questions to be attempted :	5
Section Marks :	50
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	512452919

Question Shuffling Allowed :

No

Question Number : 31 Question Id : 51245215340 Question Type : SUBJECTIVE

Correct Marks : 10

- a) What are the factors that determine the stability of conformation. (3 marks)
- b) Using potential energy diagram discuss the stabilities of boat, chair and twist boat conformation of cyclohexane. (5 marks)
- c) Ring flip does not change α or β orientation in cyclohexane. With suitable conformational structures explain. (2 marks)

Question Number : 32 Question Id : 51245215341 Question Type : SUBJECTIVE

Correct Marks : 10

- a) Comment about the aromatic nature of cyclopentadienyl species-cation, anion and radical. Draw the Muslin-Frost diagram and explain. (4 marks)
- b) What is homo aromaticity. (2 marks)
- c) Identify the product formed when *cis* and *trans* butene reacts with bromine. (4 marks)

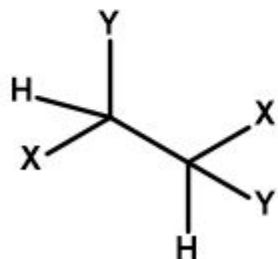
Question Number : 33 Question Id : 51245215342 Question Type : SUBJECTIVE

Correct Marks : 10

a) Can 'R' and 'S' notation be related to axial chirality 'P' and 'M'. If they are related, explain how they are related. If they are not related, explain why they are not related? (3 marks)

b) Draw all the possible stereoisomers (conformational and configurational including Fischer and Newman Projection) and assign R, S notation to all the isomers having the following structural representation.

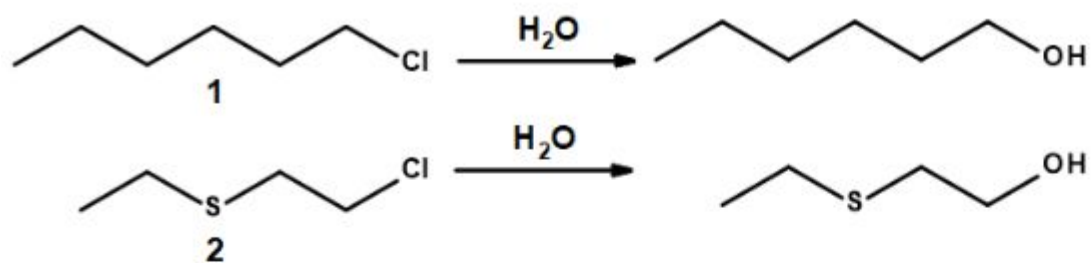
Assume the priority $Y > X > H$. (7 marks)



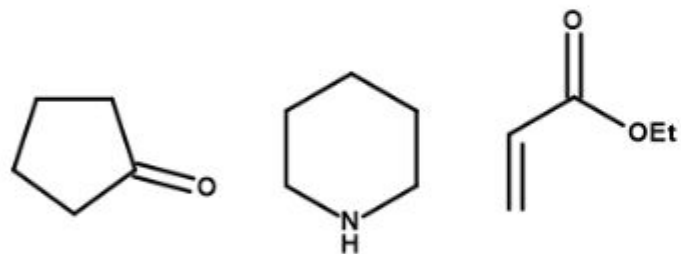
Question Number : 34 Question Id : 51245215343 Question Type : SUBJECTIVE

Correct Marks : 10

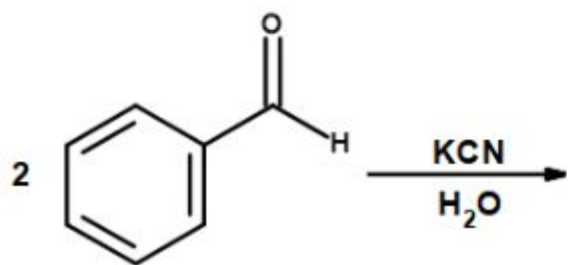
Explain why substrate 2 undergoes solvolysis much faster than substrate 1. (2 marks)



b) Write the Gilbert Stork enamine formation and subsequent product formation with the following substrates/reagents. (4 marks)



c) With suitable mechanism identify the product formed in the following reaction. (4 marks)

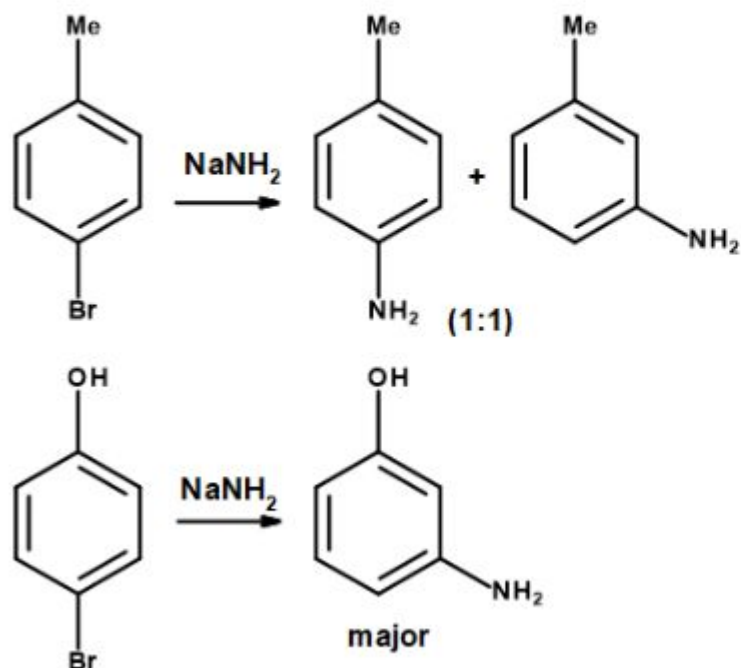


Question Number : 35 Question Id : 51245215344 Question Type : SUBJECTIVE

Correct Marks : 10

a) Using Hammond postulate and potential energy diagram explain nitration of benzoic acid, toluene and phenol. (6 marks)

b) With suitable mechanism explain the product formation. (4 marks)



Question Number : 36 Question Id : 51245215345 Question Type : SUBJECTIVE

Correct Marks : 10

a) In the base-catalysed hydrolysis of *m*- NO_2 , and *m*-Me, substituted ethyl benzoates with that of the unsubstituted ester, it was found that rate of hydrolysis is faster in the *m*-nitro derivative. Explain this using Hammett equation principle. (4 marks)

b) With suitable examples explain how Conjugation, Hybridization, Hyperconjugation and Captodative effects (Carbon centered radical) stabilize carbon free radicals. (6 marks)

Question Number : 37 Question Id : 51245215346 Question Type : SUBJECTIVE

Correct Marks : 10

a) With suitable example explain Sharpless epoxidation catalytic cycle. (8 marks)

b) What are the advantages of Copper catalyzed Azide-alkyne cyclo addition reaction over conventional catalyst free Azide-alkyne cyclo addition reaction. (2 marks)