CHEMISTRY

BOOKS - SURA CHEMISTRY (TAMIL ENGLISH)

BASIC CONCEPTS OF ORGANIC REACTIONS

Evaluation Choose The Answer

1. What is the hybridisation state of benzyl carbonium ion ?

A. sp^2

B. spd^2

C. sp^3

D. sp^2d

Answer: A

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2. Decreasing order of nucleophilicity is

A. $OH^- > , NH_2^- > , {}^-OCH_3 > RNH_2$

B. $NH_2^- > OH^- > {}^-OCH_3 > RNH_2$

C. $NH_2^- > CH_3O^- > OH^- > RNH_2$

D. $CH_3O^- > NH_2^- > OH^- > RNH_2$

Answer: B

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3. Which of the following species is not electrophilic in nature ?

A. Cl^+

B. BH_3

C. H_3O^+

D. $^+NO_2$

Answer: C

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4. Homolytic fission of covalent bond leads to the formation of

A. electrophile

B. nucleophile

C. carbo cation

D. free radical

Answer: D

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5. Hyper Conjugation is also known as

A. no bond resonance

B. Baker - nathan effect

C. both (a) and (b)

D. none of these

Answer: C

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6. Which of the group has highest +I effect ?

A. CH_3^-

B. $CH_3 - CH_2^-$

C. $(CH_3)_2 - CH -$

D. $(CH_3)_3 - C -$

Answer: D

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7. Which of the following speeles does not exert a reasonance effect ?

A. C_6H_5OH

B. C_6H_5Cl

C. $C_6H_5NH_2$

D. $C_6H_5\overset{+}{N}H_3$

Answer: D

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8. $-I$ effect is shown by

A. $-Cl$

B. $-Br$

C. both (a) and (b)

D. $-CH_3$

Answer: C

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9. Which of the following carbocation will be most stable ?

A. $Ph_3C^+_-$

B. $CH_3 - \overset{+}{C}H_2 -$

C. $(CH_3)_2 - \overset{+}{C}H$

D. $CH_2 = CH - \overset{+}{C}H_2$

Answer: A

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10. Assertion : Tertiary Carbocations are generally formed more easily than primary Carbocations ions .

Reason : Hyper conjugation as well as inductive effect due to additional alkyl group stabilize tertiary carboninum ions .

A. both assertion and reason are true and reason is the correct explanation of assertion .

B. both assertion and reason are true but reason is not the correct' explanation of assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false

Answer: A

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11. Heterolytic fission of C-C results in the formation of

A. free radical

B. Carbonion

C. Carbocation

D. Carbanion and Carbocation

Answer: D

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12. Which of the following represent a set of nuclephiles ?

A. BF_3, H_2O, NH^{2-}

B. $AlCl_3, Bf_3, NH_3$

C. CN^-, RCH_2^-, ROH

D. $H^+, RNH_3^+, :CCl_2$

Answer: C

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13. Which f the following species does not acts as a nucleophile ?

A. ROH

B. ROR

C. PCl_3

D. BF_3

Answer: D

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14. The geometrical shape of carbocation is

A. Linear

B. tetrahedral

C. Planar

D. Pyramidal

Answer: C

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Evaluation Ii Write Brief Answer To The Following Questions

1. Writes short notes on Resonance

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2. Writes short notes on Hyperconjucation

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3. What are electrophiles and nucleophiles ? Give suitable examples for each.

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4. Show the heterolysis of covalent bond by using curved arrow notation and ocmplete the following equation . Identify the nucleophile is each case .

$CH_3 - Br + KOH \rightarrow$

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5. Show the heterolysis of covalent bond by using curved arrow notation and ocmplete the following equation . Identify the nucleophile is each case .

$CH_3 - OCH_3 + HI \rightarrow$

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6. Explain inductive effect with suitable example

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7. Explain electromeric effect

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8. Given examples for the following types of organic reactions

β - elimination

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9. Given examples for the following types of organic reactions

electrophilic substitution .

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Additional Questions Choose The Correct Answers 1 Mark

1. Statement : Chloro acetic acid is more acidic than acetic acid

Reason : Chloro group has + 1 effect

A. Both Assertion , Reason are correct

B. Assertion is false , Reason is correct

C. Assertion is correct, Reason is false

D. Both assertion and reason are false

Answer: C

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2. In which of the following homolytic bond fission takes place ?

A. Alkaline hydrolysis of ethyl chloride

B. Addition of HBr to double bond

C. Photochlorination of methane

D. Nitration of benzene

Answer: C

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3. Which of the following is heterolytic compound ?

A. Pyrrole

B. Furan

C. Thiophene

D. All the these

Answer: D

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4. The most stable carbocation is

A. $CH_3 - \overset{+}{C}H_2$

B. $CH_3 - \overset{+}{C}H - CH_3$

C. $CH_2 = CH - CH_2$

D. $\overset{+}{C}H_3$

Answer: C

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5. Which of the following has maximum -I effect

A. $-F$

B. $-NO_2$

C. $-CN$

D. $-OH^2$

Answer: B

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6. In $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_3$ most stable radicals/ions formed on homolysis is/a.

A. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2$

B. $CH_3 - \underset{\underset{CH_3}{|}}{C} - CH_3$ and H

C. $CH_3 - \overset{+}{\underset{\underset{CH_3}{|}}{C}} - CH_3$ and H

D. $CH_3 - \overset{-}{\underset{\underset{CH_3}{|}}{C}} - CH_3$ and H

Answer: B

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7. The most stable carbocation is

A. $CH_3 - CH - CH_3$

B. $CH_3 - CH - CH_2 - CH_3$

C. $CH_3 - CH - CH_2 - CH_2 - CH_3$

D. $CH_3 - CH_2 - CH - CH_2 - CH$

Answer: A

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8. The most stable carbanion is

A. $CH_3 - CH_2^-$

B. $CH_2 = CH^-$

C. $CH_2 \equiv C^-$

D. $(CH_3)_2 - CH^-$

Answer: C

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9. The most stable alkene is

A. $CH_2 = CH - CH_2 - CH_3$

B. $CH_2 = \underset{\underset{CH_3}{|}}{C} - CH_2$

C. $CH_2 = CH - CH = CH_2$

D. $CH_3 - CH = CH - CH_3$

Answer: B

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10. In $\underset{I}{-NO_2}$ $\underset{II}{-NH_2}$ $\underset{III}{-SO_3H}$, the decreasing order of -I effect is

A. $I > II > III$

B. $I > III > II$

C. $III > II > I$

D. $III > I > II$

Answer: B

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11. CH_2 is an

A. electrophile

B. Nucleophile

C. Free Radical

D. Ambiphiles

Answer: A

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12. The nucleophile is not

A. Lewis base

B. Lewis acid

C. H_2O

D. Carbanion

Answer: B

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13. Which of the following statements is not correct for a nucleophile?

A. Nucleophiles attack low electron density sites

B. Nucleophiles are not electron seeking

C. Necleophiles is a Lewis acid

D. Ammonia is a nucleophile

Answer: C

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14. Assertion (A): Allyl carbanion $(CH_2 = CH - CH_2)$ is more stable than $CH_2 - NO_2$

Reason (R) : On $CH_2 - NO_2$, only -I effect of No group is present while is allyl carbanion resonance is present

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true statement but R is false

D. Both A and R are false

Answer: B

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15. Which of the following compounds will not underge Friedal-craft's reaction easily ?

A. Xylene

B. Nitrobenzene

C. Toluene

D. Cumene

Answer: B

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16. Assertion (A) : Phenol is less acidic than benzoic acid.

Reason (R) : Phenoxide has less number of resonating structures that benzyl carboxylate ion .

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true statement but R is false

D. Both A and R are false

Answer: C

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17. The electromeric effect is

A. Permanent effect

B. Temporary effect

C. p-electrons transfer in the effect

D. Both (b) and (c)

Answer: D

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18.

$$CH_3 - CH = CH - CH_3 + Br_2 \rightarrow CH_3 - \underset{\underset{Br}{|}}{CH} - \underset{\underset{Br}{|}}{CH} - CH_3$$

is an

A. Substitution reaction

B. Elimination reaction

C. Electrophilic addition reaction

D. Nucleophilic addition reaction

Answer: C

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19. Which one is incorrect match of reactions ?

A. 

B. $CH_3 - CH_2 - Br \xrightarrow{aq, KOH} CH_3 - CH_2OH \rightarrow$

Nucleophilic substitution reaction

C. 

D. $(CH_3)C - C \xrightarrow{\overset{+}{H}} (CH_3)_3C - CH_2 + H_2O + Cl^- \rightarrow$

Nucleophilic substitution reaction .

Answer: D

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20. The correct statement for α-elimination is

A. It forms cyclic compounds

B. It forms carbene or substituted carbene

C. Two atoms are removed from α and β positions

D. In $CHCl_3\alpha$ - eliminationis not possible

Answer: B

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21. The stability of alkyl free radicals is due to

A. Hyperconjugation

B. $+I$ effect

C. $-I$ effect

D. Both a &b

Answer: D

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22. Among the following compounds the one that is most reaction towards electrophilic niration is

A. Toluene

B. Benzene

C. Benzoic acid

D. Nitrobenzene

Answer: A

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23. Assertion (A) : $CH_3 - CH - CH_3$ has 6 hyper-conjugative hydrogens.

While $CH_3 - CH - CH_2 - CH_3$ has 5 hyper-conjugative hydrogens .

Reason (R) : $CH_3 - \overset{+}{C}H - CH_3$ is more stable than $CH_3 - \overset{+}{C}H - CH_2 - CH_3$

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true but R is false

D. Both A and R are false

Answer: B

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24. when the electrons move towards the substituent attached to the conjugated system_____effect occurs .

A. $-R$

B. $+R$

C. $-I$

D. $+I$

Answer: A

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25. Which is useful is explaining certain properties such as acidity of phenol?

A. Inductive

B. Reasonance

C. Hyper conjucation

D. Electromeric

Answer: B

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26. Assertion (A): addition of HCN in alkene is a type of electrophilic substitution reaction.

Reason (R) : in first step , H_3O^+ attacks on double bond .

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true but R is false

D. Both A and R are false

Answer: D

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27. Assertion (A) : Phenol is less acidic than benzoic acid.

Reason (R) : Phenoxide has less number of resonating structures

that benzyl carboxylate ion .

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true but R is false

D. Both A and R are false

Answer: C

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28. Assertion (A) : $C_2H_5 - \overset{+}{C}H - C_2H_5$ is more stable then $CH_3 - \overset{+}{C}H - CH_3$

Reason (R) : Positive inductive effective of C_2H_5 -group is less than $CH_3 -$ group .

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true but R is false

D. Both A and R are false

Answer: D

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29. Assertion (A) : $CH_3 - BH - \overset{+}{C}H_2$ connot show resonance.

Reason (R) : Boron and carbocation both are electron defficient species .

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true but R is false

D. Both A and R are false

Answer: A

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30. Assertion (A) : $BrCl + I$ can form to 6 different geometrical isomers .

Reason (R) : Each one structure is geometrical isomere of other five structures .

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true but R is false

D. Both A and R are false

Answer: C

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31. Carbon-carbon bond order is benzene is 1.5 due to

A. Inductive effect

B. Electromeric effect

C. Resonance

D. H-bonding

Answer: C

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32. Assertion (A) : Phenol is more reactive than toluence toward S_E reaction .

Reason (R) : $\ddot{O}H$ group shows +R and _I both effect .

A. Both A and R are ture and R is the correct explanation of A .

B. Both A and R are true but R is not correct explanation of A.

C. A is true but R is false

D. Both A and R are false

Answer: C

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33. Which of the following is the most acidic ?

A. HCOOH

B. CH_3COOH

C. CH_3CH_2COOH

D. $CH_3CH_2CH_2COOH$

Answer: A

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34. In which of the following, the group attached to the benzene ring shows + R effect ?

A. 

B. 

C. 

D. All the these

Answer: D

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35. Electromeric effect involves the complete transfer of

A. σ-electron

B. π-electron

C. proton

D. both σ and π electrons

Answer: B

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36. Which step in the mechanism determines the overall rate of the reaction ?

A. Fastest

B. Slowest

C. Forward

D. Backward

Answer: B

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37. What type of cleavage occurs in a compound containing non polar covalent bond formed between atoms of similar electronegativity ?

A. Homolytic clevage

B. Heterolytic clevage

C. Homelyfit fission

D. Heterolytic fission

Answer: A

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38. Which one is used as free radical initiator in polymerisation reaction ?

A. ethylene

B. butyronitrile

C. azobisiso butronitrile

D. triphenyl phospine

Answer: C

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39. The heterolytic cleavage of C-H bonds results in the formation of _____

A. carbanion

B. carbocation

C. Hydri

D. Hydronium

Answer: A

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40. Which of the following is incorrect ?

A. Nucleophiles are reagents that has high affinity for electro positive centres.

B. They possess an atom has an shared pair of electrons and hence it is in search for an electropositive centre .

C. It can have an opportunity to share its electrons to form a covalent bond .

D. All Lewis bases act as nucleophiles .

Answer: D

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41. The $\prod$ electron is transferred towards the attacking reagent it is called _____

A. $+I$ Effect

B. $-I$ Effect

C. $-E$ Effect

D. $+E$ Effect

Answer: D

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42. Assertion (A) : The inductive effect does not transfer electrons from one atom to another .

Reason (R) : The inductive effect represents the ability of a particular atom or a group density to the attached carbon .

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A) .

C. (A) true but (R) false .

D. Both (A) and (R) are false .

Answer: A

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43. $Nu^- + X = Y \rightarrow \underset{\underset{Nu}{|}}{X} - Y^-$

This reaction represents which effect ?

A. $+I$ Effect

B. $-I$ Effect

C. $-E$ Effect

D. $+E$ Effect

Answer: C

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44. Which of the following is correct ?

A. Hyper conjugation effect is also observed when atoms/groups having lone pair of electrons are attached by

a single bond and in conjugation with a n-bond.

B. The lone pair of electrons enters into resonance and displaces n electrons resulting in more than one structure .

C. When electronegative atoms or group of atoms are in conjugation with a n-bond, they pull-electrons from the multiple bond .

D. All the above are correct .

Answer: D

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45. Aliphatic nulcleophilic substitution reactions take places either by _____ or _____ mechanism .

A. $S_N{}^1$, $S_N{}^2$

B. E_1, E_2

C. `Addition , substitution

D. Replacement , condense

Answer: A

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46. Which is a characteristic reaction of an unsaturated compound?

A. Addition reaction

B. Substitution

C. Electrophilic

D. nuuclesphilic

Answer: A

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Additional Questions Choose The Correct Answers 2 Mark

1. Identify the electrophilic centre in the following compound & $CH_3 - CH = O, CH_3, CN, CH_3I$.

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2. Which of the two is expected to be more stable and why ?

$O_2NCH_2CH_2\bar{O}$ (or) $CH_3CH_2\bar{O}$

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3. Which of the two structures A and B given below is more stabilised by resonance? Explain .

CH_3COOH and CH_3COO

A B

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4. Draw the resonating structure of $C_6H_5NH_2$.

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5. How will you determine the rate of chemical reaction ?

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6. Write short notes on (i) + E effect and (ii) -E effect

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7. When does the carbon in an alkene molecule acquires a positive charges ? Explain .

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8. Discuss the effect of hyperconjugation in propene.

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9. How does the addition reaction affect the hybridisation of the substrale ? Give example .

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10. Write a short note on oxidation and reduction reactions .

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11. What are organic reactions ?

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12. What are free radical initiators ?

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13. What are Cabanions ?

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14. Write a short note on negative mesomeric effect .

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Additional Questions Short Answers Questions

1. Distinguish between electrophiles and nucleophiles

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2. What are the possible types of electrons movement ?

Represent then by clearly indicating the electrons shift .

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3. Discuss the reason behind the classification of inductive effect into +I and -I effect .

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4. Explain the substitution reaction in detail with suitables examples .

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5. Carry over the following reaction mechanisms .

Bromination of alkene

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6. Carry over the following reaction mechanisms .

Addition of HCN to CH_3CHO

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7. Carry over the following reaction mechanisms .

Formation of alkyl bromide with benzoyl peroxide as radical initiator .

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Additional Questions Long Answers Questions

1. Give a detailed account on homolytic and heterolytic cleavage .

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2. Why do you classify mesomeric effect (M-effect) into + M and -M effect ?

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3. Why type of mesomeric effect is observed in phenol ? Explain.

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4. Write the complete chemical equation for the following .

Hydrolysis of alkyl halide

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5. Write the complete chemical equation for the following .

Nitration of benzene

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6. Write the complete chemical equation for the following .

Reduction of benzene

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7. Write the complete chemical equation for the following .

Bromination of alkene

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8. Write the complete chemical equation for the following .

Oxidation of 4-hydroxy phenol

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9. Discuss the inter conversions observed in the following fun

Alcohol

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10. Discuss the inter conversions observed in the following fun

Alkyhalide

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11. Discuss the inter conversions observed in the following fun

Alkyl cyanide

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12. Explain the types of substitution reaction ?

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13. An organic compound (A) of a molecular formula C_2H_4 . Which is a simple alkene . A reacts with dil . H_2SO_4 to give B.A again

reacts with Cl_2 to give C . Identify A , B and and write the equation

.

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Creative Questions Hots

1. $CH_2 = \bar{C}H$ is more basic then $HC \equiv C^-$. Explain why ?

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2. Why does SO_3 act as an electrophile ?

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3. Why is benzylic free radical more stable then allylic free radical ?

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4. Classify the followiing reactions in one of the reaction type studied in this unit .

$CH_3CH_2Br + H\bar{S} \rightarrow CH_3CH_2SH + Br$

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5. Classify the followiing reactions in one of the reaction type studied in this unit .

$(CH_3)_2C = CH_2 + HCl \rightarrow (CH_3)_2CCl - CH_3$

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6. Classify the followiing reactions in one of the reaction type studied in this unit .

$CH_3 - CH_2Br + \bar{HO} \rightarrow CH_2 = CH_2 + H_2O + Br$

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7. Classify the followiing reactions in one of the reaction type studied in this unit .

$(CH_3)_3C - CH_2OH + HB \rightarrow (CH_3)_2CBr - CH_2 - CH_3 + H_2O$

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8. Which of th following ions is more stable ? Use resonane to explain your answer .

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9. Arrange the following compounds in increasing order of acidity.

(i) $CH_3CH(Br)CH_2COOH$

(ii) $CH_3CH_2CH(Br)COOH$

(iii) $CH_3CH_2C(Br)_2COOH$

(iv) $CH_2BrCH_2CH_2COOH$

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10. Which of the following compounds will not exist as resonance hybrid ? Give reason for your answer .

$CH_3 - OH$

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11. Which of the following compounds will not exist as resonance hybrid ? Give reason for your answer .

$R - CONH_2$

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12. Which of the following compounds will not exist as resonance hybrid ? Give reason for your answer .

$CH_3 - CH = CH - CH_2NH_2$

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13. Write structures of various carbocations that can be obtained from 2-methylbutane . Arrange these carbocations in order of increasing stabililty.

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14. The structure of triphenylmethyl cation is given below . This very stable and some of its salts can be stored for months . Explain the cause of high stability of this cation .

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