

2020
(CBCS)
(2nd Semester)
CHEMISTRY
SECOND PAPER (CHEM/2/CC/121)
(**Organic chemistry-I**)

1. Choose the correct answer from below:

i) In general the inductive effect of the alkyl groups is in the order

- a) $3^0 > 2^0 > 1^0$
- b) $1^0 > 2^0 > 3^0$
- c) $2^0 > 1^0 > 3^0$
- d) None of the above

ii) Stability of carbonium ion follows

- a) Primary > Secondary > Tertiary
- b) Secondary > tertiary > primary
- c) Tertiary > secondary > Primary
- d) None of the above

iii) Which one of the following is said to have +I effect

- a) COOH
- b) F
- c) CH₃—
- d) OH

iv) The central atom of carbanion is said to possess

- a) sp-hybridized orbital
- b) sp³-hybridized orbital
- c) sp²-hybridized orbital
- d) None of the above

v) Boron trifluoride acts as an electrophile because it has

- a) Lone pair of electrons
- b) Vacant orbitals
- c) Three fluorine directly bonded to it
- d) None of the above

vi) The carbon-carbon distance in benzene ring is

- a) 1.40 Å
- b) 1.6 Å
- c) 1.2 Å
- d) 0.4 Å

vii) The heat of hydrogenation of benzene is

- a) 40 kcal/mole
- b) 30 kcal/mole
- c) 50 kcal/mole
- d) None of the above

viii) The number of pi-electrons in naphthalene is

- a) 10
- b) 8
- c) 12
- d) 6

ix) The reactivity of aromatic halogen towards nucleophilic substitution is

- a) Lower than that of alkyl halides
- b) Higher than that of alkyl halides
- c) Equal to that of alkyl halides
- d) None of the above

x) The coupling reaction of aryl and alkyl halides in the presence of sodium ether to form alkylated aromatic hydrocarbons is referred to as

- a) Aldol condensation
- b) Wurtz-Fittig reaction
- c) Gattermann reaction
- d) Reimer-Tiemann reaction

xi) When hydrogen cyanide is added to benzaldehyde in the presence of alkali cyanide the following compound is formed

- a) Phenylhydrazone
- b) Benzoic acid
- c) Cyanohydrin
- d) None of the above

xii) The decreasing order of reactivity of ketones is

- a) Acetone > Ethyl methyl ketone > Diethyl ketone
- b) Ethyl methyl ketone > Acetone > Diethyl ketone
- c) Diethyl ketone > Acetone > Ethyl methyl ketone
- d) None of the above

xiii) The acidity of chlorobutanoic acids are in the order of

- a) 2-Chlorobutanoic acid > 3-Chlorobutanoic acid > 4-Chlorobutanoic acid
- b) 4-Chlorobutanoic acid > 3-Chlorobutanoic acid > 2-Chlorobutanoic acid
- c) 3-Chlorobutanoic acid > 4-Chlorobutanoic acid > 2-Chlorobutanoic acid
- d) None of the above

xiv) Methyl ketones on oxidation with halogen and sodium hydroxide give

- a) Amine
- b) Aldehyde
- c) Ketone
- d) Carboxylic acid

xv) Esterification is a reaction between carboxylic acid and

- a) Alcohol
- b) Ketone
- c) Aldehyde
- d) None of the above

xvi) The tertiary amine with all the alkyl group the same is referred to as

- a) Mixed amine
- b) Symmetrical amine
- c) Unsymmetrical amine
- d) None of the above

xvii) The Hybridisation of central N-atom in amine is

- a) sp
- b) sp^2
- c) sp^3
- d) None of the above

xviii) In general the order of basic strength in amine is

- a) $1^0 > 2^0 > 3^0$
- b) $2^0 < 3^0 > 1^0$
- c) $3^0 > 1^0 > 2^0$
- d) $1^0 < 2^0 > 3^0$

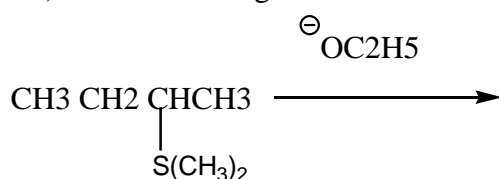
xix) When the given amine is treated with benzenesulphonyl chloride in the presence of cold aqueous NaOH, primary amine produces

- a) N-alkylsulphonamide
- b) N,N-dialkylsulphonamide
- c) Benzene
- d) None of the above

xx) Secondary amine reacts with nitrous acid to give

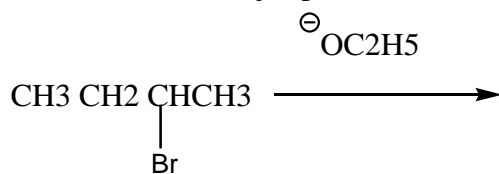
- a) Alcohol
- b) Nitrosoamine
- c) Trialkylammonium nitrite
- d) None of the above

xxi) In the following elimination reaction the major product will be



- a) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$
- b) $\text{CH}_3\text{CH}=\text{CHCH}_3$
- c) $\text{CH}_2=\text{CH}(\text{CH}_2)_2\text{CH}_3$
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xxii) Predict the major product of



- a) $\text{CH}_3\text{CH}=\text{CHCH}_3$
- b) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$
- c) $\text{CH}_2=\text{CH}(\text{CH}_2)_2\text{CH}_3$
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xxiii) The order of reactivity of alkyl group for $\text{S}_\text{N}2$ reaction is

- a) Tertiary > Secondary > Primary > Methyl
- b) Primary > Methyl > Secondary > Tertiary
- c) Methyl > Primary > secondary > Tertiary
- d) None of the above

xxiv) For halide ions the nucleophilic reactivities follow the order

- a) $\text{I}^- > \text{Br}^- > \text{Cl}^- > \text{F}^-$
- b) $\text{F}^- > \text{Cl}^- > \text{Br}^- > \text{I}^-$
- c) $\text{Br}^- > \text{Cl}^- > \text{I}^- > \text{F}^-$
- d) $\text{Cl}^- > \text{Br}^- > \text{F}^- > \text{I}^-$

xxv) Reaction of alcohol and thionyl chloride to give alkyl chloride with the retention of configuration takes place through

- a) SN1 reaction
- b) SN2 reaction
- c) S_Ni reaction
- d) None of the above

2. Fill in the blanks

i) A group of atom in a conjugated system is said to have _____ when the direction of electron displacement is away from it

ii) The effect which causes a temporary polarization in the substrate molecule at the seat of a multiple bond by shift of an electron-pair from one atom to the other under the influence of electrophilic reagent is called _____

iii) A covalent bond undergoes fission when each of the departing atoms makes away with one of the bonding pair of electrons is known as _____

iv) The resonance stabilisation of benzene is _____

v) According to Huckel rule the number of pi-electrons in an aromatic compound will be equal to _____

vi) The bond angle in benzene ring is _____

vii) Benzaldehyde condenses with hydroxylamine and _____ to form benzaldoxime and phenylhydrazine

viii) The boiling point of benzaldehyde is _____

ix) Phenol ionises in water to form _____ ion

x) Ammonia when dissolved in water forms _____ and hydroxide ion

xi) _____ amines having no available hydrogen atom on nitrogen do not react with CS₂

xii) Primary _____ form carbylamine when warmed with chloroform and ethanolic solution of KOH

xiii) A substitution reaction where bond making and bond breaking occur simultaneously is called _____

xiv) The conversion of the (+) form to (–) form or vice versa, without recourse to resolution is known as _____. It is observed in S_N2 reaction

xv) Among the given halide ions (F^- , Cl^- , Br^- , I^-) the best nucleophile in polar aprotic solvent is _____

Answer key (The correct answer is given in bold letter)

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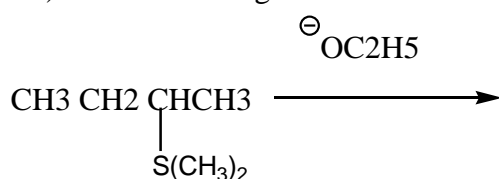
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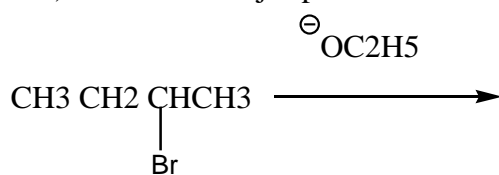
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- b) F⁻ > Cl⁻ > Br⁻ > I⁻
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- d) Cl⁻ > Br⁻ > F⁻ > I⁻

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- a) SN1 reaction
- b) SN2 reaction
- c) **SNi reaction**
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- iii) A covalent bond undergoes fission when each of the departing atoms makes away with one of the bonding pair of electrons is known as **homolytic bond fission**
- iv) The resonance stabilisation of benzene is **35.8 kcal/mole**
- v) According to Huckel rule the number of pi-electrons in an aromatic compound will be equal to **4n + 2**
- vi) The bond angle in benzene ring is **120°**
- vii) Benzaldehyde condenses with hydroxylamine and **phenylhydrazine** to form benzaldehyde oxime and phenylhydrazone
- viii) The boiling point of benzaldehyde is **179° C**
- ix) Phenol ionises in water to form **phenoxide** ion
- x) Ammonia when dissolved in water forms **ammonium ion** and hydroxide ion
- xi) **Tertiary** amines having no available hydrogen atom on nitrogen do not react with CS₂
- xii) Primary **amine** form carbylamine when warmed with chloroform and ethanolic solution of KOH
- xiii) A substitution reaction where bond making and bond breaking occur simultaneously is called **SN2 reaction**
- xiv) The conversion of the (+) form to (-) form or vice versa, without recourse to resolution is known as **walden inversion**. It is observed in SN2 reaction
- xv) Among the given halide ions (F⁻, Cl⁻, Br⁻, I⁻) the best nucleophile in polar aprotic solvent is **F⁻**