Exercise-1

Marked Questions may have for Revision Questions.

OBJECTIVE QUESTIONS

Section (A) : Preparation of Carbonyl Compounds

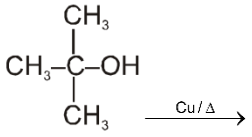
A-1. On heating calcium propionate, the product formed is
(1*) 3-Pentanone (2) 2-Pentanone (3) 3-Methyl-2-butanone (4) Propanone

A-2. A mixed salt of calcium acetate formate on dry distillation gives
(1*) ethanal (2) methanal (3) propanone (4) All the three above.

A-3. Acetic acid when heated (300ºC) with MnO gives
(1) formaldehyde (2) acetaldehyde (3*) acetone (4) butaone

A-4. In which of the following reaction ketone is formed :

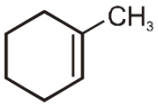
(1) $CH_3–CH_2–OH \xrightarrow{KMnO_4/\overset{\oplus}{H}}$ (2) $CH_3–CH_2–OH \xrightarrow{Cu/\Delta}$

(3*) $CH_3–\underset{CH_3}{\overset{CH}{|}}–OH \xrightarrow{Cu/\Delta}$ (4)  $\xrightarrow{Cu/\Delta}$

A-5. Ethylidene chloride on treatment with aq. KOH gives
(1*) CH_3CHO (2) $CH_2OH.CH_2OH$ (3) HCHO (4) CHO. CHO

A-6. Benzene reacts with CH_3COCl in the presence of $AlCl_3$ to give
(1) C_6H_5COCl (2) C_6H_5Cl (3) $C_6H_5CH_3$ (4*) $C_6H_5COCH_3$

A-7. Aldehydes can be prepared from acid chlorides by
(1) Clemmensen reduction (2) Wolff-kishner reduction
(3*) Rosenmund's reduction (4) $LiAlH_4$ reduction.

A-8.  On reductive ozonolysis yields
(1*) 6-oxoheptanal (2) 6-oxoheptanoic acid
(3) 6-hydroxyheptanal (4) 3-hydroxypentanal

Section (B) : Aldol condensation

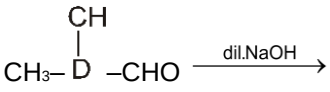
B-1. Aldol condensation is the characteristic reaction of
(1) all aldehydes and ketones.
(2*) only those aldehydes and ketones which contain α-hydrogen atoms.
(3) only those aldehydes and ketones which do not contain α-hydrogen atoms.
(4) only aromatic aldehydes and ketones.

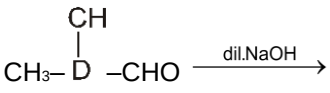
B-2. Which of the following compounds will undergo self aldol condensation in the presence of cold dilute alkali ?
(1) C_6H_5CHO (2*) CH_3CHO (3) $HC\equiv C–CHO$ (4) $CH_2=CH–CHO$

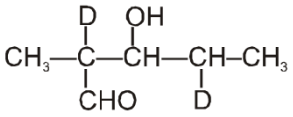
B-3. Base-catalysed aldol condensation will occur with

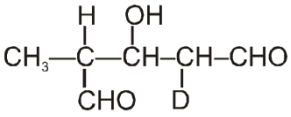
(1) Benzaldehyde (2*) Propionaldehyde
(3) Formaldehyde (4) 2, 2-Dimethylpropionaldehyde.

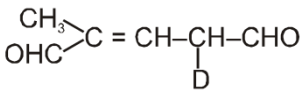
B-4. Treatment of propionaldehyde with dilute NaOH solution gives
(1) $CH_3CH_2COOCH_2CH_2CH_3$ (2*) $CH_3CH_2CHOHCH(CH_3)CHO$
(3) $CH_3CH_2CHOHCH_2CH_2CHO$ (4) $CH_3CH_2COCH_2CH_2CHO$

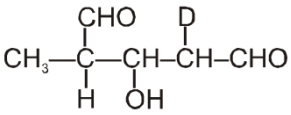
B-5.  Product, The product of this reaction would be :-

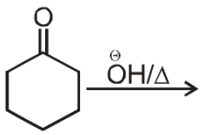
 mRikn] bl vfHkfØ;k dk mRikn gSA

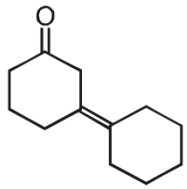
(1*) 

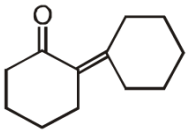
(2) 

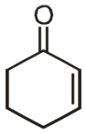
(3) 

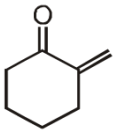
(4) 

B-6.  Product is : (mRikn gS%)

(1) 

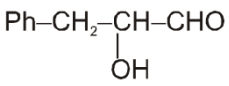
(2*) 

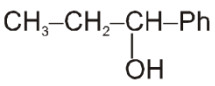
(3) 

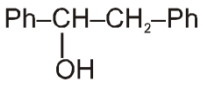
(4) 

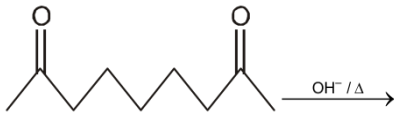
B-7. Acetaldehyde reacts with nitromethane in the presence of dil. NaOH to give
(1*) 1-Nitro-2-propanol (2) 2-Nitro-1-propanol (3) 2-Nitro-2-propanol (4) None of the above

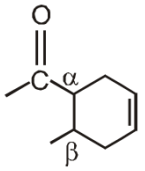
B-8. $Ph–CHO + CH_3–CHO \xrightarrow{\overset{\ominus}{O}H/\Delta}$ Product is: (mRikn gS%)

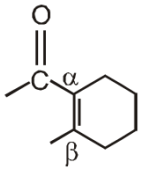
(1*) Ph –CH =CH– CHO (2) 

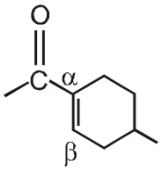
(3) 

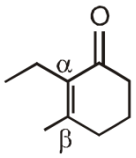
(4) 

B-9.  Product is

(1) 

(2*) 

(3) 

(4) 

Section (C) : Cannizzaro's reaction

C-1. Cannizzaro's reaction is an example of

(1*) Disproportionation reaction (2) Substitution reaction
(3) Elimination reaction (4) Addition reaction

C-2. Benzaldehyde, when heated with conc. KOH solution, gives
(1) $C_6H_5CH_2OH$ only (2) C_6H_5COOH only
(3) C_6H_5COOK only (4*) a mixture of C_6H_5COOK and $C_6H_5CH_2OH$

C-3. The Cannizzaro's reaction is not given by :
(1) C_6H_5CHO (2) HCHO (3*) CH_3CHO (4) $(CH_3)_3C–CHO$

C-4. Benzaldehyde is converted to benzyl alcohol by :
(1) Wurtz reaction (2*) Cannizzaro reaction (3) Fittig reaction (4) Wurtz Fittig reaction

C-5. $OHC–CHO \xrightarrow{OH^-} HOH_2C–COOH$ The reaction is known as :
(1) Aldol condensation (2) Perkin reaction
(3*) Intramolecular cannizzaro reaction (4) Cross cannizzaro reaction

C-6. In the reaction, $(CH_3)_3CCHO + HCHO \xrightarrow[heat]{NaOH} A + B.$
the products (A) and (B) are respectively :
(1*) $(CH_3)_3CCH_2OH$ and $HCOO^- Na^+$. (2) $(CH_3)_3CCOONa$ and CH_3OH.
(3) $(CH_3)_3CCH_2OH$ and CH_3OH. (4) $(CH_3)_3COONa$ and $HCOO^- Na^+$.

Section (D) : Perkin, Haloform and other name reaction

D-1. The reaction,

$$C_6H_5CHO + (CH_3CO)_2O \xrightarrow[(ii)H^+/H_2O]{(i)CH_3COONa/453K} C_6H_5CH = CHCOOH + CH_3COOH$$

is called
(1) Benzoin condensation (2) Aldol condensation
(3) Etard reaction (4*) Perkin's reaction

D-2. The only aldehyde which undergoes haloform reaction is
(1) Formaldehyde (2*) Acetaldehyde (3) Benzaldehyde (4) Propionaldehyde

D-3. An optically active compound reacts with hydroxylamine to form an oxime and also gives a positive haloform test. What is the structure of the compound ?

D-4. A compound with molecular formula, C_4H_8O gives a positive haloform test and a 2,4-DNP derivative. The compound is
(1) $CH_3CH_2CH_2CHO$ (2*) $CH_3COCH_2CH_3$ (3) $(CH_3)_2CHCHO$ (4) All the above.

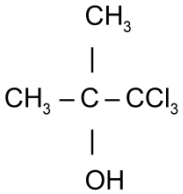
D-5. Acetaldehyde reacts with phosphorus pentachloride to form
(1) Acetyl chloride (2) Ethyl chloride (3) Ethylene chloride (4*) Ethylidene chloride

D-6. Formalin is an aqueous solution of
(1) Fluorescein (2) Formic acid (3*) Formaldehyde (4) Furfuraldehyde

D-7. Mesitylene is formed by :
(1) HCHO (2) CH_3CHO (3*) CH_3COCH_3 (4) CH_3COOH

D-8. Trioxane has the formula  , it is prepared from :
(1*) formaldehyde (2) methanol (3) dichloromethane (4) vinyl alcohol

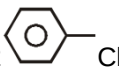
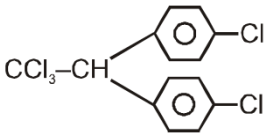
D-9. Which of the following reactions represent incorrect major product.



(1) $CHCl_3 + CH_3COCH_3 \longrightarrow$ (Chloretone – hypnotic)

(2) Ph. $NH_2 + CHCl_3 + KOH \longrightarrow PhN \rightrightarrows C$ (Bad Smell)

(3*) $PhOH + CHCl_3 + NaOH \longrightarrow Ph - O - CH_3$

(4) $CCl_3-CH = O + 2$  $\xrightarrow{\text{Conc. } H_2SO_4}$  (DDT)

D-10. When $C_6H_5COCH_3$ reacts with NaOH and bromine, it gives :
(1) $CHBr_3$ (2) C_6H_5CONa
(3*) $C_6H_5COONa + CHBr_3$ (4) CH_3COONa

D-11. Tollen's reagent is
(1) Ammonical cuprous chloride (2) Ammonical cuprous oxide
(3) Ammonical silver bromide (4*) Ammonical silver nitrate

D-12. Tollen's reagent is not reduced by
(1) Formic acid (2) Acetaldehyde (3) Benzaldehyde (4*) Acetic acid.

D-13. Aldehydes can be oxidised by
(1) Tollen's reagent (2) Fehling solution (3) Benedict solution (4*) All of these

D-14. Crotonaldehyde ($CH_3CH=CHCHO$) can be easily oxidised to crotonic acid ($CH_3CH=CHCOOH$) by using
(1) Alkaline $KMnO_4$ (2) Acidic $K_2Cr_2O_7$ (3*) Tollen's reagent (4) HNO_3

D-15. Oxidation of compound X gives a product which reacts with phenylhydrazine but does not give a silver mirror test. Possible structure for X is
(1) CH_3CHO (2) CH_3CH_2OH (3*) $(CH_3)_2CHOH$ (4) $CH_3CH_2CH_2OH$

D-16. Fehiling's solution is
(1) Acidified $CuSO_4$ solution
(2) Ammonical $CuSO_4$ solution
(3*) Copper sulphate + sodium hydroxide + Rochelle salt
(4) Copper acetate + sodium citrate.

D-17. Which does not react with Fehling solution ?
(1) Acetaldehyde (2*) Benzaldehyde (3) Butanal (4) Formic acid

D-18. A compound gives a yellow precipitate on warming with iodine and aq. solution of NaOH. Its vapour density is 29. the compound is :
(1) CH_3CH_2CHO (2*) CH_3COCH_3 (3) $CH_3CHOHCH_3$ (4) $CH_3CH_2CH_2OH$

Section (E) : Preparaction and chemical reaction of carboxylic acid

E-1. Acetic acid is obtained when
(1) Methyl alcohol is oxidised with potassium permanganate
(2) Formaldehyde is oxidised with potassium dichromate and sulphuric acid
(3*) Acetonitrile is hydrolysed with a dilute mineral acid
(4) Glycerol is heated with sulphuric acid.

E-2. In the following reaction sequence product Y is

$$C_2H_5Br \xrightarrow{KCN} X \xrightarrow[Boil]{Dil.H_2SO_4} Y$$

(1) Ethanol (2) Ethanal (3*) Propanoic acid (4) Ethanenitrile

E-3. In the following reaction final product is :

$$C_6H_5MgBr + CO_2 \xrightarrow{Ether} \xrightarrow{H^{\oplus}}$$

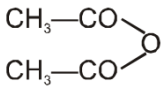
(1*) Benzoic acid (2) Benzaldehyde (3) Benzamide (4) Benzene
(1*) csUtksbd vEy (2) csUtsfYMgkbM (3) csUtsekbM (4) csUthu

E-4. The acid D obtained through the following sequence of reactions is

$$C_2H_5Br \xrightarrow{Alc.KOH} A \xrightarrow[CCl_4]{Br_2} B \xrightarrow[(excess)]{KCN} C \xrightarrow{H_3O^{\oplus}} D$$

(1*) Succinic acid (2) Malonic acid (3) Maleic acid (4) Oxalic acid

E-5. Which of the following does not give benzoic acid on hydrolysis ?
(1) Phenyl cyanide (2) Benzoyl chloride (3*) Benzyl chloride (4) Methyl benzoate

E-6. (Acetic anhydride)  on hydrolysis gives :
(1) $CH_3COOC_2H_5$ (2*) CH_3COOH
(3) C_2H_5OH (4) none of these buesa ls dksbZ ugha

E-7. In which of the following reaction the final product is neither an acid nor an acid salt.

(1) $Ph–CHO \xrightarrow{Tollen's\ reagent}$ (2) $CH_3–CH_2–OH \xrightarrow{KMnO_4/\bar{O}H}$
(3*) $Ph–CHO \xrightarrow{Fehling\ solution}$ (4) $Ph–CH_2–OH \xrightarrow{K_2Cr_2O_7/H^+}$

E-8. When excess of chlorine is passed through acetic acid in presence of red phosphorus, it forms
(1) Acetic anhydride (2) Chloral (3*) Trichloroacetic acid (4) Methyl chloride.

E-9. Which of the following will not undergo Hell-Volhard Zelinsky (HVZ) reaction ?
(1*) HCOOH (2) CH_3COOH (3) CH_3CH_2COOH (4) $CH_3CHBrCOOH$.

E-10. Identify Z in the following reaction sequence

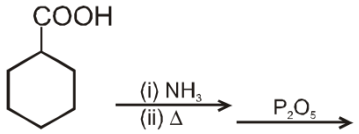
$$CH_3I \xrightarrow[Ether]{Mg} X \xrightarrow[(ii)\ H_3O^+]{(i)\ Dry\ ice} Y \xrightarrow[Red\ P]{Cl_2} Z$$

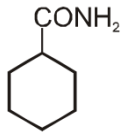
(1) CH_3COOH (2) CH_3MgI (3) CH_3COCl (4*) $ClCH_2COOH$.

E-11. The reaction : $RCOOAg + Br_2 \xrightarrow{CCl_4, Reflux} R–Br + AgBr + CO_2$ is called
(1) Wurtz reaction (2*) Hunsdiecker reaction
(3) Friedel-Crafts reaction (4) Kolbe's reaction

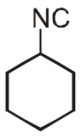
E-12. It is difficult to esterify $R_3C–COOH$ because of
(1*) Steric hindrance (2) Delocalization
(3) Inductive effect of the R group (4) Hyperconjugation of the alkyl groups

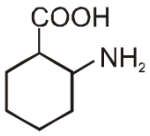
E-13. The product of the following reaction is :



(1) 

(2*) 

(3) 

(4) 

E-14. Benzoyl chloride on treatment with ammonia gives
(1*) Benzamide (2) Acetamide (3) Benzylamine (4) Benzoic acid

E-15. Acetic anhydride is prepared in the laboratory by heating sodium acetate with
(1) ethyl chloride (2*) acetyl chloride
(3) Ethanol (4) zinc dust

E-16. Synthesis of an ester involves the reaction of alcohols with
(1) a ketone (2) an amide (3) CH_3MgBr (4*) RCOCl

E-17. Diazomethane reacts with carboxylic acids to form
(1) Amines (2*) Methyl esters (3) Alcohols (4) Aldehydes.

E-18. What product is formed when acetic acid reacts with P_2O_5 .
(1) Acetyl chloride (2) Trichloro acetic acid (3*) Acetic anhydride (4) Di-chloro acetic acid

E-19. The product formed by the reaction of acetamide with Br_2 in presence of NaOH is :
(1) CH_3CN (2) CH_3CHO (3) CH_3CH_2OH (4*) CH_3NH_2

E-20. $Ph – CO – NH_2 \xrightarrow[\Delta]{KOBr}$ Product is
(1) $Ph–CH_3$ (2) Ph–CHO (3) $Ph–CH_2–NH_2$ (4*) $Ph–NH_2$

Exercise-2

Tough Problems (can be taken from previous years' IIT-JEE Sheets single choice question + AIPMT Previous years questions + AIIMS previous years' questions.

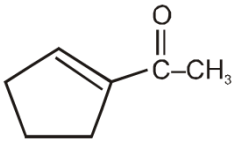
PART - I : OBJECTIVE QUESTIONS

1. A dihaloalkane on alkaline hydrolysis produces a ketone with formula C_3H_6O. The dihaloalkane can be

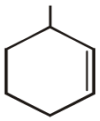
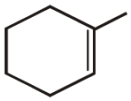
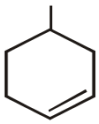
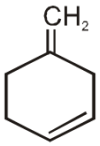
(1*) 2,2-Dichloropropane (2) 1,1-Dichloropropane
(3) 1,2-Dichloropropane (4) 1,3-Dichloropropane

2. (X) is the product of mixed aldol condensation between benzaldehyde (C_6H_5CHO) and acetone What is its structure ?

(1*) $C_6H_5–CH=CH–\overset{\overset{O}{\|}}{C}–CH_3$ (2) $C_6H_5–CH=C(CH_3)_2$
(3) $C_6H_5–CO–CH_2–C=C(CH_3)_2$ (4) None of these

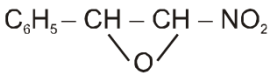
3. (A) $\xrightarrow[(2)\ Zn,H_2O]{(1)\ O_3}$ (B) $\xrightarrow[\Delta]{NaOH}$ 

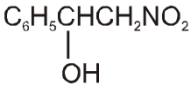
The reactant (A) will be :

(1)  (2*)  (3)  (4) 

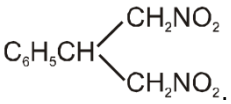
4. The major product formed in the reaction is . (fuEu vfHkfØ;k esa eq[; mRikn gSA)

$C_6H_5CHO + CH_3NO_2 \xrightarrow[heat]{NaOH}$ (X)

(1) 

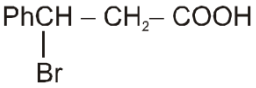
(2) 

(3*) $C_6H_5CH = CH – NO_2$

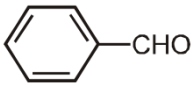
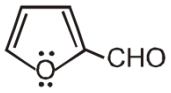
(4)  .

5. $PhCHO + (CH_3CO)_2O \xrightarrow[\Delta]{(1)CH_3COONa}$ A $\xrightarrow{HBr}$ B

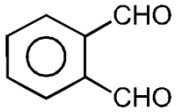
The product B is : (mRikn B gS %)

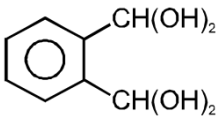
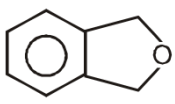
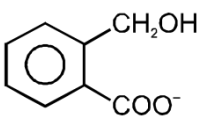
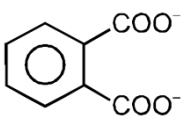
(1) $PhCH = CHCH_2Br$ (2*) 
(3) $PhCH_2\ CH(Br)\ COOH$ (4) $PhCH = CH – COBr$

6. Cannizzaro reaction does not take place with

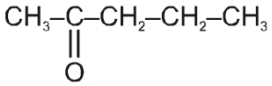
(1) $(CH_3)_3CCHO$ (2)  (3)  (4*) CH_3CHO.

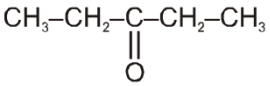
7. Product of the following reaction is

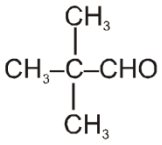
 + conc. NaOH $\xrightarrow{heat}$?

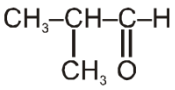
(1)  (2)  (3)  (4) 

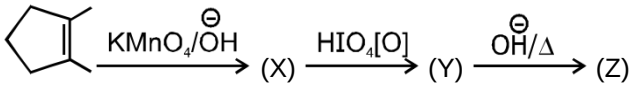
8. A compound (A) $C_5H_{10}O$ forms a phenyl hydrazone gives negative Tollen's test and positive Iodoform test compound can be :

(1*) 

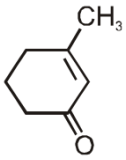
(2) 

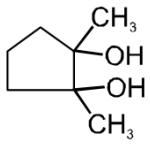
(3) 

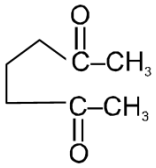
(4) 

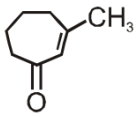
9. 

The product (Z) of the above reaction is :

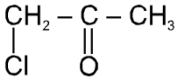
(1*) 

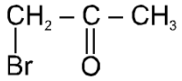
(2) 

(3) 

(4) 

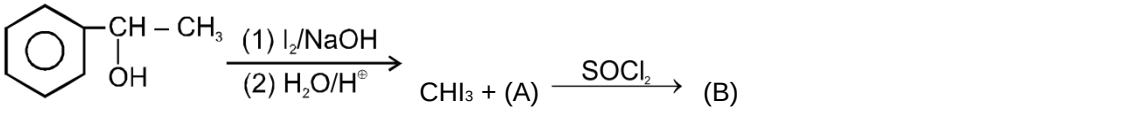
10. Which of the following gives haloform reaction

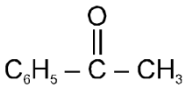
(1) 

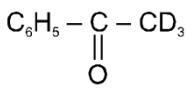
(2) 

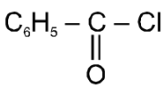
(3) $CH_3–CH_2–OH$ (4*) All of these

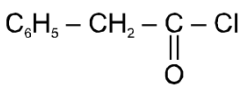
11. Identify product (B) in the following reaction sequence



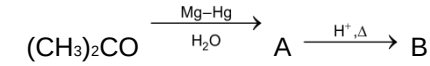
(1) 

(2) 

(3*) 

(4) 

12. In the following reaction,



A and B are respectively :

(1) 2, 3-Butanediol and 2-Butanone

(2) 1, 2-Ethanediol and glyoxal

(3*) 2, 3-Dimethyl-2, 3-butanediol and 3, 3-Dimethyl-2-butanone

(4) 2, 3-Dimethoxybutane and Propanone.

13. Acetone and acetaldehyde are differentiated by

(1) HNO_2 (2) $NH_2OH/H^{\oplus}$ (3) $NaOH + I_2$ (4*) $[Ag(NH_3)_2]^{\oplus}$

14. Schiff's base and chiff's reagent are

(1) Structural isomers (2) Anomers

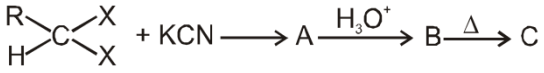
(3) Diastereomers (4*) Entirely different compounds.

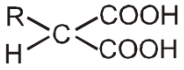
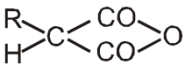
Carboxylic Acid and Derivatives

15. Hydrolysis of hydrogen cyanide results in the formation of

(1*) Formic acid (2) Acetic acid (3) Formaldehyde (4) Acetaldehyde.

16. The final product in the following reaction is :



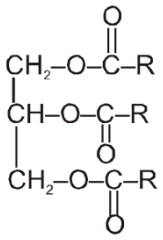
(1)  (2*) $R–CH_2–COOH$ (3)  (4) 1 and 2 both

17. In Hunsdiecker reaction

(1*) Number of carbon atoms decreased. (2) Number of carbon atoms increased

(3) Number of carbon atoms remains same (4) May be increase or decrease

18. An optically active compound (X) has molecular formula $C_4H_8O_3$. It evolves CO_2 with $NaHCO_3$. (X) reacts with $LiAlH_4$ to give an achiral compound. Structure of (X) is.

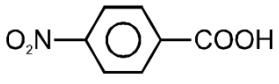
19.  + 3 NaOH –→ (Q) + salt of fatty acid.

Product (Q) of the reaction is

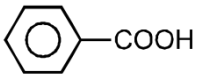
(1) Ethylene glycol (2*) Glycerol

(3) Glyceryl tri nitrate (explosive) (4) Cumene hydrogen peroxides

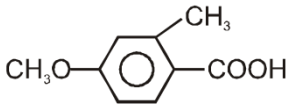
20. Give the order of ease of the esterification of the following acid



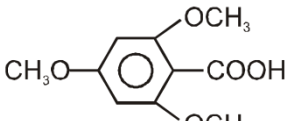
(I)



(II)



(III)

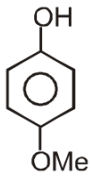
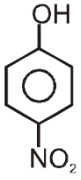


(IV)

(1*) I > II > III > IV (2) IV > III > II > I

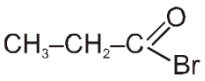
(3) II > I > IV > III (4) IV > II > III > I

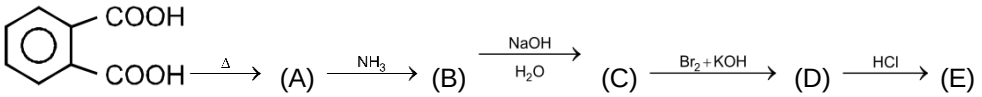
21. Acetic acid reacts separately with the following phenols. The rate of esterification is highest for -

(1)  (2*)  (3)  (4) 

22. Starting from propanoic acid, the following reactions were carried out

Propanoic acid $\xrightarrow{SOCl_2}$ X $\xrightarrow{NH_3}$ Y $\xrightarrow{Br_2+KOH}$ Z (the compound Z is)

(1) $CH_3–CH_2–Br$ (2*) $CH_3–CH_2–NH_2$ (3)  (4) $CH_3–CH_2–CH_2–NH_2$

23. 

In this reaction the product (E) is :

(1) o-nitrobenzoic acid (2) Salicylic acid

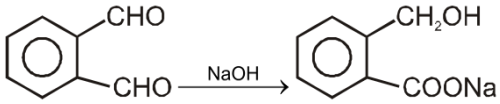
(3*) anthranilic acid (4) Crotonic acid

Comprehension # 1

24. Aldehydes undergo disproportionation reaction in presence of aqueous NaOH. Simultaneous oxidation and reduction of a compound is scientifically called as disproportionation. Aldehydes having no α-hydrogen show this reaction called Cannizzaro's reaction . The reaction may be represented as :

$$C_6H_5CHO + C_6H_5CHO \xrightarrow[\Delta]{NaOH} C_6H_5COONa + C_6H_5CH_2OH$$

Intramolecular Cannizzaro's reaction is also possible.



Answer the following questions :

(a) The aldehyde which shows Cannizzaro's reaction is

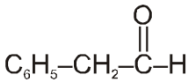
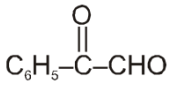
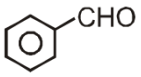
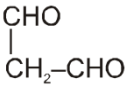
(1) HCHO (2) C_6H_5CHO (3) $(CH_3)_3C–CHO$ (4*) All of these

(b) Mixture of C_6H_5CHO and HCHO is treated with NaOH then Cannizzaro's reaction involves :

(1*) Oxidation of HCHO (2) Reduction of HCHO

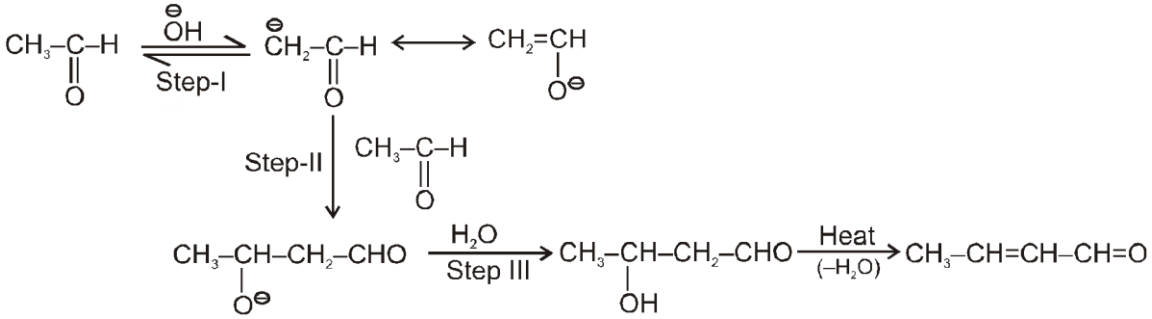
(3) Oxidation of C_6H_5CHO (4) Reduction and oxidation of C_6H_5CHO

(c) Which of the following compounds gives intramolecular crossed Cannizzaro's reaction ?

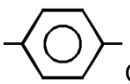
(1)  (2*)  (3)  (4) 

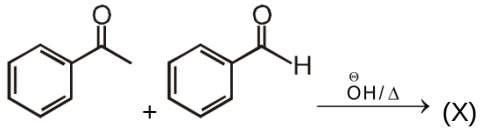
Comprehension # 2

25. Carbonyl compound which contains α–H gives aldol condenation reaction in presence of alkaline medium. The reaction between two molecules of acetaldehyde takes place as follows in presence of base.



(a) Aldol condensation reaction is given by

(1) $C_6H_5–CHO$ (2) $CX_3 – CHO$ (3) O_2N  CHO (4*) $C_6H_5–CH_2–CHO$

(b)  (X)

Producct [X] is

(1*) Ph–O–C(=O)–CH=CH–Ph (2) Ph–O–C(=O)–CH_2–CH_2–Ph

(3) Ph–CH= CH–CH(OH)–Ph (4) Ph–CH= C=CH–Ph

(c) Intramolecular aldol condensation reaction is given by

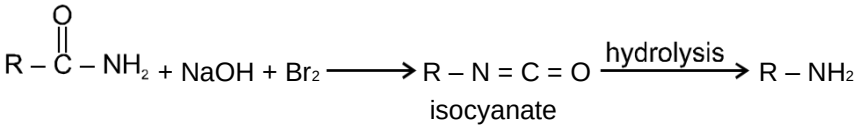
(1) 1,4 diketone (2) 1,6 diketone (3) 1,5 and 1,7 diketone (4*) All of these

Comprehension - 3

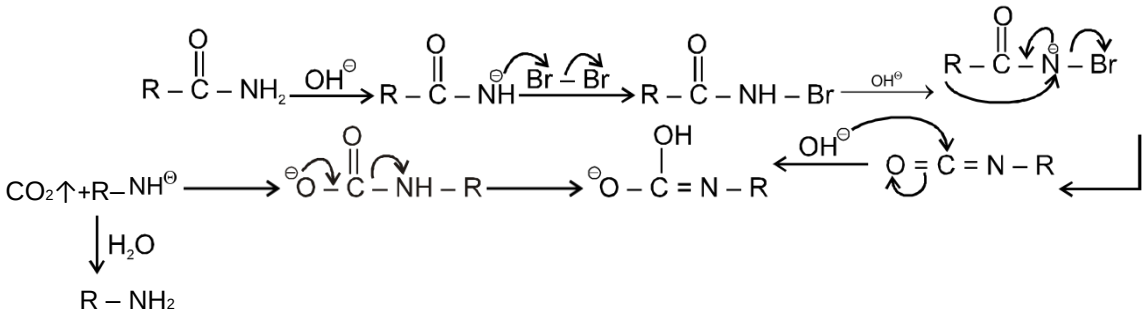
26. Hofmann rearrangement

In the Hofmann rearrangement an unsubstituted amide is treated with sodium hydroxide and bromine to give a primary amine that has one carbon lesser than starting amide.

General reaction :

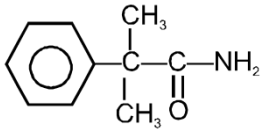


Mechanism :

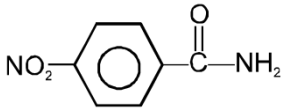


If the migrating group is chiral then its cofiguration is retained. Electron releasing effects in the migrating group increases reactivity of Hofmann rearrangement.

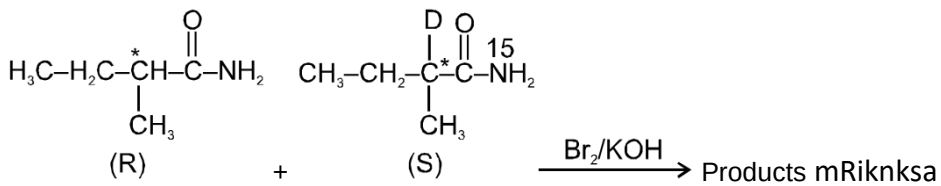
(a) Which of the following compound(s) cannot give Hoffmann rearrangement :

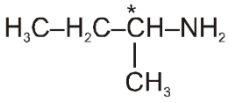
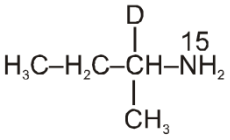
(1) 

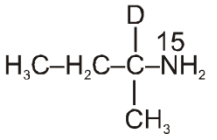
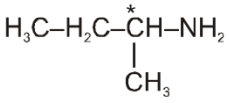
(2*) CH_3–CH_2–C(=O)–NH–Ph

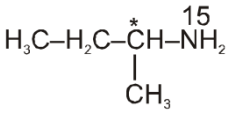
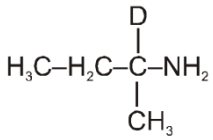
(3) 

(4) Ph–C(=O)–NH_2

(b) 

(1)  (S) &  (R)

(2*)  (S) &  (R)

(3)  (R) &  (S)

(4) (2) & (3) both are correct

PART - II : MISCELLANEOUS QUESTIONS

Section (A) : ASSERTION/REASONING

DIRECTIONS :

Each question has 4 choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

(1) Both assertion and reason are correct, and the reason is the correct explanation for the assertion

(2) Both assertion and reason are correct, but the reason is not the correct explanation for the assertion

(3) The assertion is incorrect, but the reason is correct

(4) Both are assertion and reason are incorrect

A-1. **Assertion :** Acetophenone and benzophenone can be distinguished by iodoform test.
Reason : Acetophenone and benzophenone both are carbonyl compounds.

A-2. **Assertion :** 2,2– Dimethyl propanal undergoes Cannizzaro reaction with concentrated NaOH.
Reason : Cannizzaro reaction is a disproportionation reaction.

A-3. **Assertion :** Benzaldehyde undergoes disproportionation reaction in basic medium.
Reason : Aldehydes which do not have α-hydrogen undergo Cannizzaro reaction (i.e. disproportionation reaction).

A-4. **Assertion :** 1º Amides react with Br_2 in presence of NaOH to form1º-amine having one carbon atom less than amide.
Reason : It is degradative reduction involving N-bromoalkanamide intermediate.

A-5. **Assertion :** Carboxylic acids have a carbonyl group but they do not give the test of carbonyl group.
Reason : Due to resonance, the double bond character of carbonyl group is greatly reduced.

Section (B) : MATCH THE COLUMN

Note : Only one answer type

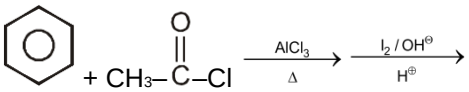
B-1.

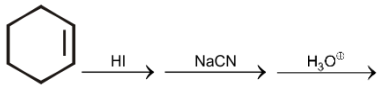
Column I	**Column II**
(A) Ph–CHO $\xrightarrow[CS_2,\ \Delta]{CrO_2Cl_2}$	(P) Perkin's Reaction
(B) Ph–CHO $\xrightarrow[AcONa,\ \Delta]{Ac_2O}$	(Q) Etard Reaction
(C) Ph–CHO $\xrightarrow{Al(OEt)_3}$	(R) Aldol Reaction

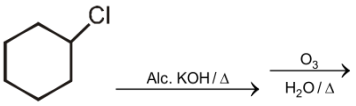
(D) $Ph–COCH_3 \xrightarrow{NaOH}$ (S) Tischenko reaction

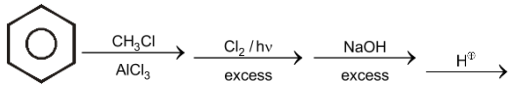
Section (C) : ONE OR MORE THAN ONE OPTIONS CORRECT

C-1. Which of the following reactions will produce carboxylic acid, as their end product.

(1*) 

(2*) 

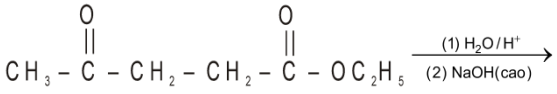
(3*) 

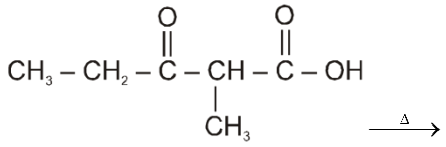
(4*) 

C-2. Which of the following will give 3-pentanone.

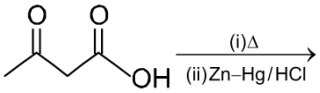
(1*) $(CH_3 – CH_2COO)_2 Ca \xrightarrow{\Delta}$

(2*) $CH_3 – CH_2 – C \equiv N \xrightarrow[(2)\ H_3^{\oplus}O]{(1)\ CH_3–CH_2–MgBr}$

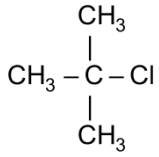
(3) 

(4*) 

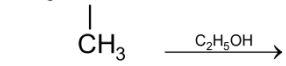
C-3. In which reaction product is hydrocarbon?

(1*) 

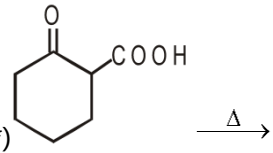
(2) $CH_3COOAg \xrightarrow{Br_2 / CCl_4}$

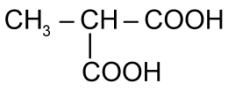


(3*) $Ph–COOH \xrightarrow[CaO,\ \Delta]{NaOH}$

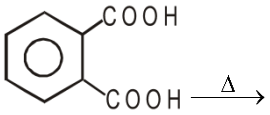
(4) 

C-4. Which of them liberate a gas which turns lime water milky.

(1*) 

(2*) 

(3*) $HOOC–(CH_2)_5–COOH \xrightarrow{Ca(OH)_2 / \Delta}$

(4) 

Exercise-3

PART - I : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

OFFLINE JEE-MAIN

ALDEHYDES & KETONES

1. Which one of the following undergoes reaction with 50% sodium hydroxide solution to give the corresponding alcohol and acid ? **[AIEEE-2004, 3/225]**

(1) Phenol (2) Benzoic acid (3) Butanal (4*) Benzaldehyde

2. The compound formed on heating chlorobenzene with chloral in the presence of concentrated sulphuric acid is **[AIEEE-2004, 3/225]**

(1) gammexene (2*) DDT (3) freon (4) hexachloroethane.

3. Reaction of cyclohexanone with dimethylamine in the presence of catalytic amount of an acid forms a compound if water during the reaction is continuously removed. The compound formed is generally known as **[AIEEE-2005, 4½/225]**

(1) Amine (2) Imine (3*) Enamine (4) Schiff's base

4. In the following sequence of reactions, **[AIEEE-2007, 3/120]**

$CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[Ether]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$. The compound 'D' is

(1*) n-propyl alcohol (2) propanal (3) butanal (4) n-butyl alcohol

5. In Cannizzaro reaction given below **[AIEEE-2009, 4/144]**

$2PhCHO \xrightarrow{:\overset{\ominus}{O}H} PhCH_2OH + PhC\overset{\ominus}{O}_2$

the slowest step is :

(1*) the transfer of hydride to the carbonyl group (2) the abstraction of proton from the carboxylic group

(3) the deprotonation of $PhCH_2OH$ (4) the attack of : $\overset{\ominus}{O}H$ at the carboxyl group

6. Trichloroacetaldehyde was subjected to Cannizzaro's reaction by using NaOH. The mixture of the products contains sodium trichloroacetate ion and another compound. The other compound is : **[AIEEE 2011, 4/120]**

(1*) 2, 2, 2–Trichloroethanol (2) Trichloromethanol

(3) 2, 2, 2–Trichloropropanol (4) Chloroform

7. Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify 'A' from the following compounds : **[AIEEE 2011, 4/120]**

(1) 1-Pentene (2) 2-Pentene

(3*) 2-Methyl-2-pentene (4) 2-Methyl-1-pentene

8. Iodoform can be prepared from all except : **[AIEEE 2012, 4/120]**

(1) Ethyl methyl ketone (2) Isopropyl alcohol

(3) 3-Methyl-2-butanone (4*) Isobutyl alcohol

CARBOXYLIC ACID & DERIVATIVES

dkcksZfDlfyd vEy ,oe~ O;qRiUu (Carboxylic acid & Derivatives)

9. On vigorous oxidation by permangnate solution $(CH_3)_2C = CHCH_2CHO$ gives **[AIEEE-2002, 3/225]**

(1) $(CH_3)_2CO$ and $OHCCH_2CHO$ (2) $(CH_3)_2C(OH)-CH(OH)CH_2CHO$

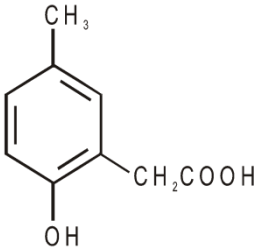
(3) $(CH_3)_2CO$ and $OHCCH_2COOH$ (4*) $(CH_3)_2CO$ and $CH_2(COOH)_2$

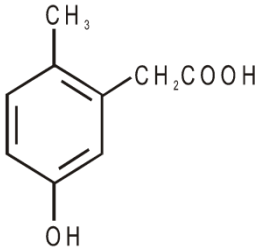
10. End product of the following reaction is : **[AIEEE-2002, 3/225]**

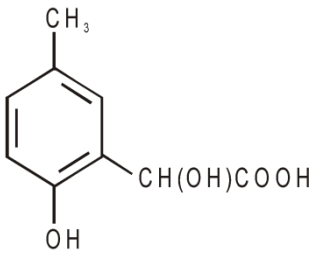
$$CH_3CH_2COOH \xrightarrow[\text{red P}]{Cl_2} \xrightarrow{\text{alcoholic KOH}}$$

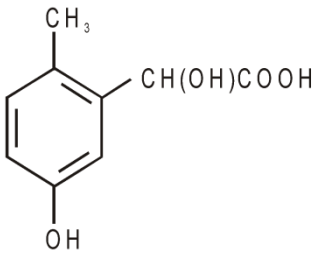
(1) $CH_3CH(OH)COOH$ (2) $CH_2(OH)CH_2COOH$ (3*) $CH_2 = CHCOOH$ (4) $CH_2(Cl)CH(OH)COOH$

11. p-cresol reacts with chloroform in alkaline medium to give the compound A which adds hydrogen cyanide to form, the compound B. The latter on acidic hydrolysis gives chiral carboxylic acid. The structure of the carboxylic acid is : **[AIEEE-2005, 4½/225]**

(1) 

(2) 

(3*) 

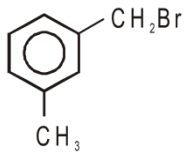
(4) 

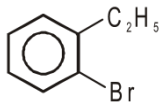
12. An organic compound having molecular mass 60 is found to be contain C = 20%, H = 6.67% and N = 46.67% while rest is oxygen. On heating it gives NH_3 along with a solid residue. The solid residue give violet colour with alkaline copper sulphate solution. The compound is : **[AIEEE-2005, 4½/225]**

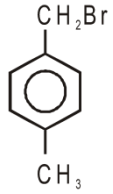
(1) $CH_3CH_2CONH_2$ (2*) $(NH_2)_2CO$ (3) CH_3CONH_2 (4) CH_3NCO

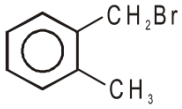
13. Compound (A), C_8H_9Br, gives a white precipitate when warmed with alcoholic $AgNO_3$. Oxidation of (A) gives an acid (B), $C_8H_6O_4$. (B) easily forms anhydride on heating. Identify the compound (A).

[JEE (Main) 2013, 4/120]

(1) 

(2) 

(3) 

(4*) 

ONLINE JEE-MAIN

ALDEHYDES & KETONES

1. Which one of the following reactions will not result in the formation of carbonation bond ?

[JEE(Main) 2014 Online (09-04-14), 4/120]

(1) Reimer-Tieman reaction (2) Friedel Craft's acylation

(3) Wurtz reaction (4*) Cannizzaro reaction

2. Which is the major product formed when acetone is heated with iodine and potassium hydroxide?

[JEE(Main) 2014 Online (09-04-14), 4/120]

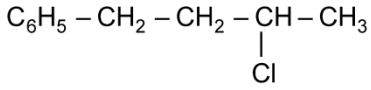
(1) Iodoacetone (2*) Acetic acid (3*) Iodoform (4) Acetophenone

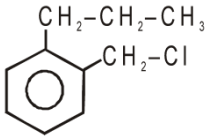
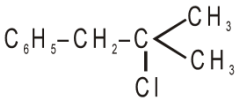
3. Tischenko reaction is a modification of **[JEE(Main) 2014 Online (11-04-14), 4/120]**

(1) Aldol condensation (2) Claisen condensation

(3*) Cannizzaro reaction (4) Pinacol-pinacolone reaction

4. A compound A with molecular formula $C_{10}H_{13}Cl$ give a white precipitate on adding silver nitrate solution. A on reacting with alcoholic KOH gives compound B as the main product. B on ozonolysis gives C and D. C gives Cannizaro reaction but not aldol condensation. D gives aldol condensation but not Cannizaro reaction. A is : **[JEE(Main) 2015 Online (10-04-15), 4/120]**

(1) $C_6H_5–CH_2–CH_2–CH_2–CH_2–Cl$ (2) 

(3)  (4*) 

5. In the presence of small amount of phosphorous, aliphatic carboxylic acids react with chlorine or bromine to yield a compound in which α-hydrogen has been replaced by halogen. This reaction is known as :

[JEE(Main) 2015 Online (10-04-15), 4/120]

(1) Wolff-Kishner reaction (2) Etard reaction

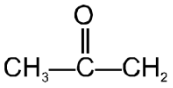
(3) Rosenmund reaction (4*) Hell-Volhard-Zelinsky reaction

6. In the reaction sequence

$2CH_3CHO \xrightarrow{OH^-} A \xrightarrow{\Delta} B$; the product B is :

[JEE(Main) 2015 Online (11-04-15), 4/120]

(1) $CH_3–CH_2–CH_2–CH_2–OH$ (2*) $CH_3–CH=CH–CHO$

(3) $CH_3–CH_2–CH_2–CH_3$ (4) 

7. The correct statement about the synthesis of erythritol ($C(CH_2OH)_4$) used in the preparation of PETN is:

[JEE(Main) 2016 Online (10-04-16), 4/120]

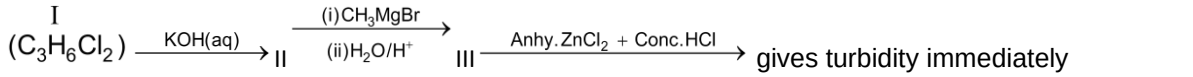
(1) The synthesis requires two aldol condensations and two Cannizzaro reactions.

(2) Alpha hydrogens of ethanol and methanol are involved in this reaction.

(3) The synthesis requires four aldol condensations between methanol and ethanol.

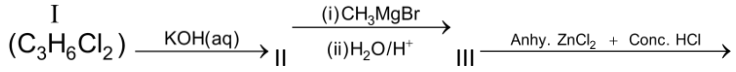
(4*) The synthesis requires three aldol condensations and one Cannizzaro reaction.

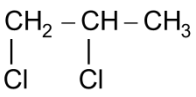
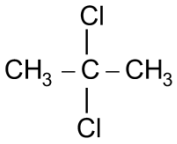
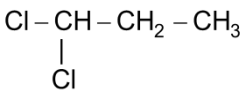
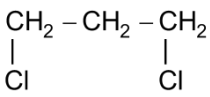
8. In the following reaction sequence :



gives turbidity immediately

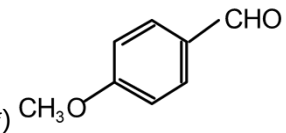
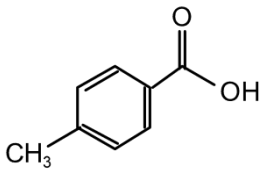
The compound I is : **[JEE(Main) 2017 Online (09-04-17), 4/120]**

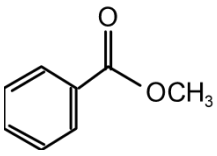
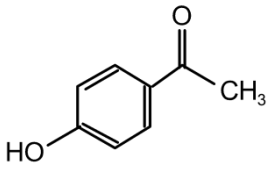


(1)  (2*)  (3)  (4) 

9. A compound of molecular formula $C_8H_8O_2$ reacts with acetophenone to form a single cross-aldol product in the presence of base. The same compound on reaction with conc. NaOH forms benzyl alcohol as one of the products. The structure of the compound is :

[JEE(Main) 2017 Online (09-04-17), 4/120]

(1*)  (2) 

(3)  (4) 

CARBOXYLIC ACID & DERIVATIVES

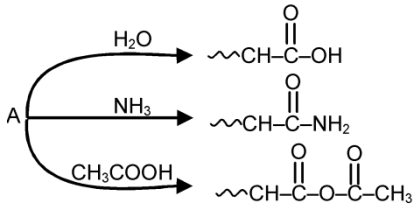
10. Among the following organic acids, the acid present in rancid butter is :

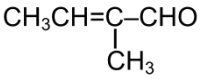
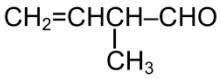
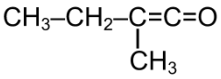
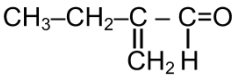
[JEE(Main) 2014 Online (19-04-14), 4/120]

(1) Pyruvic acid (2) Lactic acid (3*) Butyric acid (4) Acetic acid

11. An organic compound A, C_5H_8O; reacts with H_2O, NH_3 and CH_3COOH as described below, A is :

[JEE(Main) 2014 Online (11-04-14), 4/120]



(1)  (2)  (3*)  (4) 

12. Phthalic acid reacts with resorcinol in the presence of concentrated H_2SO_4 to give :

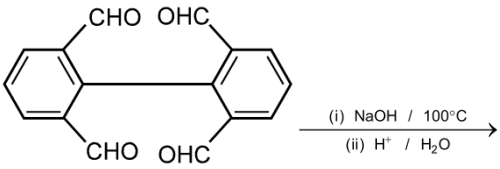
[JEE(Main) 2014 Online (12-04-14), 4/120]

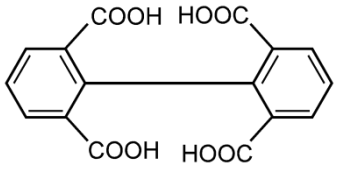
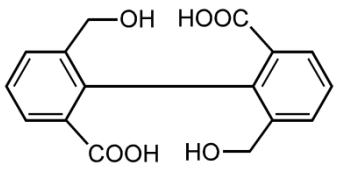
(1) Phenolphthalein (2) Alizarin (3) Coumrin (4*) Fluorescein

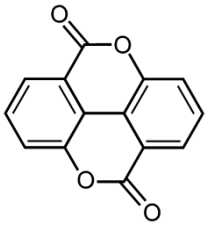
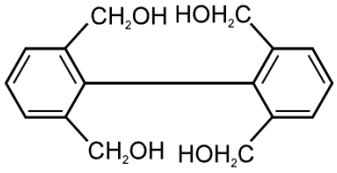
PART - II : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

ALDEHYDES & KETONES

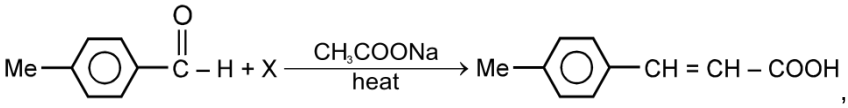
*** Marked Questions are having more than one correct option.**

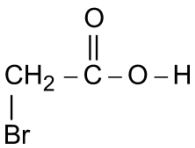
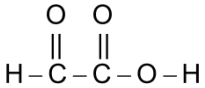
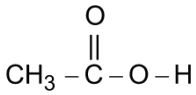
1.  Major Product is **[IIT-JEE 2003(S), 3/84]**

(A)  (B*) 

(C)  (D) 

2. In the following reaction **[IIT-JEE 2005(S), 3/84]**

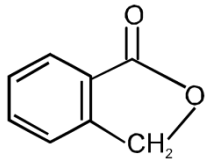
 , X can be :

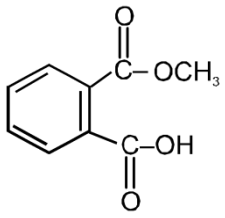
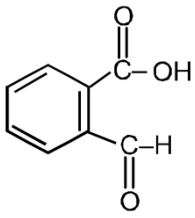
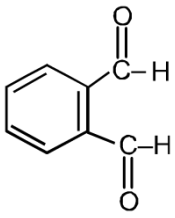
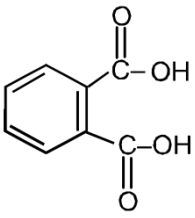
(A)  (B)  (C)  (D*) $(CH_3CO)_2O$

3. In conversion of 2-butanone to propanoic acid which reagent is used. **[IIT-JEE 2005(S), 3/84]**

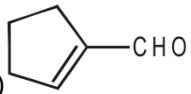
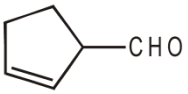
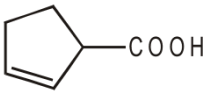
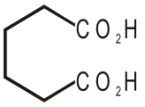
(A) NaOH, NaI / $H^{\oplus}$ (B) Fehling solution (C*) NaOH, I_2 / $H^{\oplus}$ (D) Tollen's reagent

4. Which of the following reagent on reaction with conc. NaOH followed by acidification gives following lactone as the : **[IIT-JEE 2006, 5/184]**

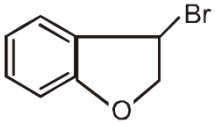
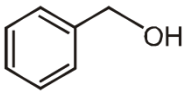
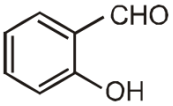
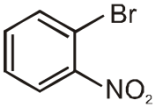


(A)  (B)  (C*)  (D) 

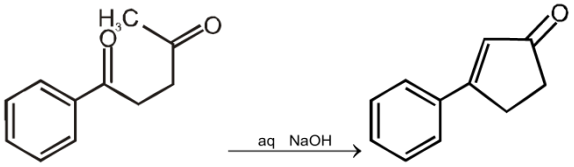
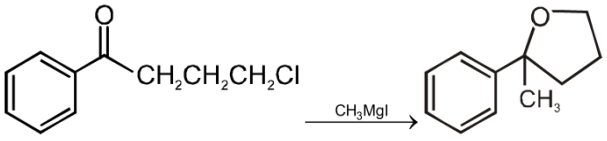
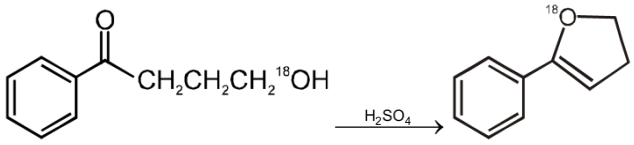
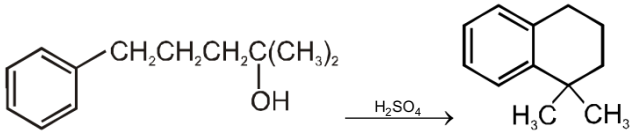
5. Cyclohexene on ozonolysis followed by reaction with zinc dust and water gives compound E. Compound E on further treatment with aqueous KOH yields compound F. Compound F is : **[JEE 2007, 3/162]**

(A*)  (B)  (C)  (D) 

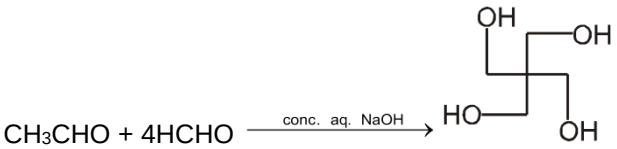
6. Match each of the compounds given in **Column I** with the reaction(s), that they can undergo, given in **column II.** **[JEE-2009, 8/160]**

Column I		**Column II**	
(A)		(p)	Nucleophilic substitution
(B)		(q)	Elimination
(C)		(r)	Nucleophilic addition
(D)		(s)	Esterification with acetic anhydride
		(t)	Dehydrogenation

7. Match the reactions in **column I** with appropriate type of steps/reactive intermediate involved in these reactions as given in **column II** **[JEE 2011, 8/160]**

Column I	Column II
(A) 	(p) Nucleophilic substitution
(B) 	(q) Electrophilic substitution
(C) 	(r) Dehydration
(D) 	(s) Nucleophilic addition (t) Carbanion

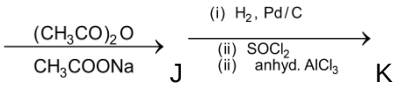
8. The number of aldol reaction (s) that occurs in the given transformation is : **[IIT-JEE 2012, 3/136]**



(A) 1 (B) 2 (C*) 3 (D) 4

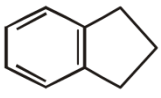
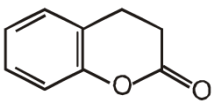
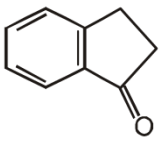
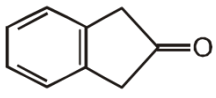
Comprehension :

In the following reactions sequence, the compound J is an intermediate.

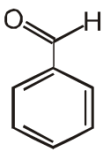
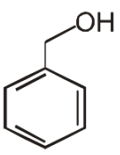
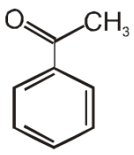
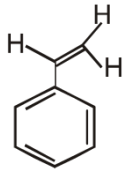


J ($C_9H_8O_2$) gives effervescence on treatment with $NaHCO_3$ and positive Baeyer's test

9. The compound K is **[IIT-JEE 2012, 3/136]**

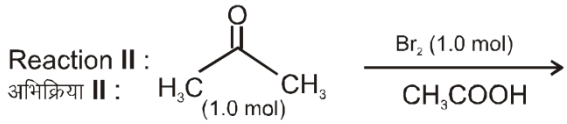
(A)  (B)  (C*)  (D) 

10. The compound I is **[IIT-JEE 2012, 3/136]**

(A*)  (B)  (C)  (D) 

11. After completion of the reactions (**I** and **II**), the organic compound(s) in the reaction mixtures is (are) **[IIT-JEE 2013, 3/120]**

Reaction **II** :
अभिक्रिया **II** :



P **Q** **R** **S** **T** **U**

(A) Reaction **I** : **P** and Reaction **II** : **P**

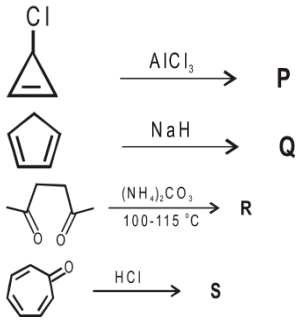
(B) Reaction **I** : **U**, acetone and Reaction **II** : **Q**, acetone

(C*) Reaction **I** : **T**, **U**, acetone and Reaction **II** : **P**

(D) Reaction **I** : **R**, acetone and Reaction **II** : **S**, acetone

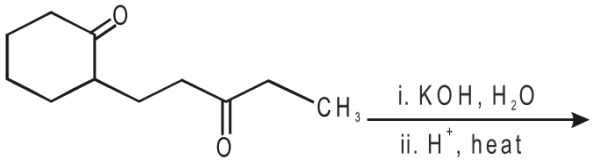
12. Among **P**, **Q**, **R** and **S**, the aromatic compound(s) is/are : **[IIT-JEE 2013, 4/120]**

(A*) P (B*) Q (C*) R (D*) S

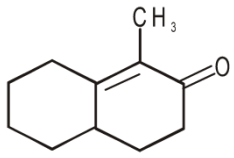


(A*) P (B*) Q (C*) R (D*) S

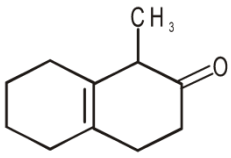
13. The major product of the following reaction is : **[JEE(Adv.)-2015, 4/168]**



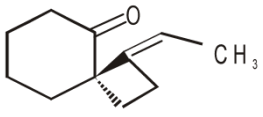
(A*)



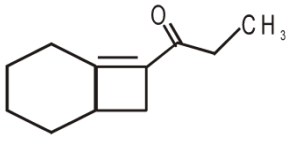
(B)



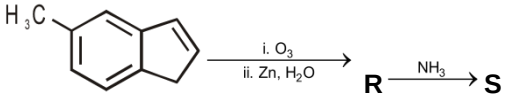
(C)



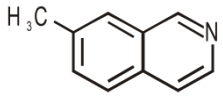
(D)



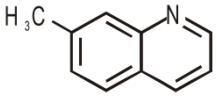
14. In the following reactions, the product **S** is **[JEE(Adv.)-2015, 4/168]**

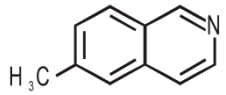


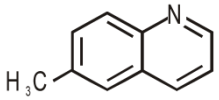
(A*)



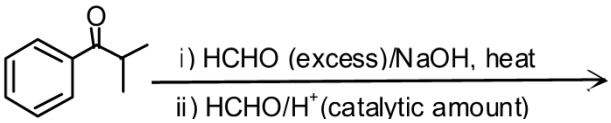
(B)

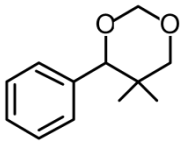


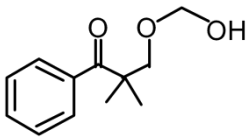
(C) 

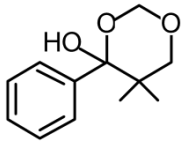
(D) 

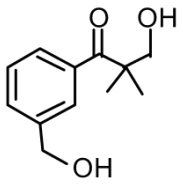
15. The major product of the following reaction sequence is **[JEE(Adv.)-2016, 3/124]**



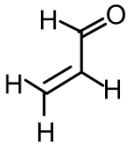
(A*) 

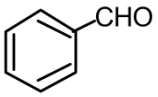
(B) 

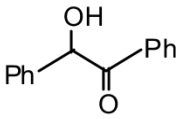
(C) 

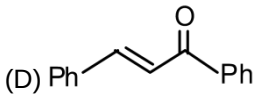
(D) 

16.* Positive Tollen's test is observed for : **[JEE(Adv.)-2016, 4/124]**

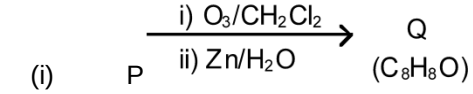
(A*) 

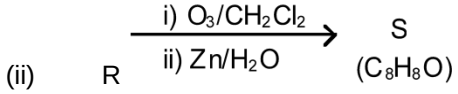
(B*) 

(C*) 

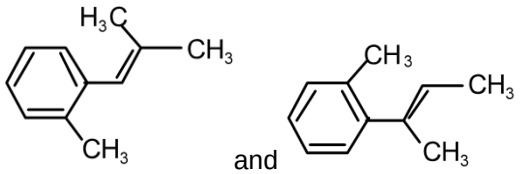
(D) 

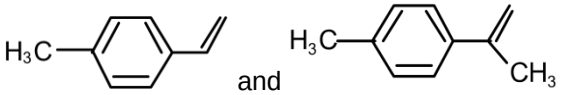
17. Compound **P** and **R** upon ozonolysis produce **Q** and **S**, respectively. The molecular formula of **Q** and **S** is C_8H_8O. **Q** undergoes Cannizzaro reaction but not haloform reaction, whereas S undergoes haloform reaction but not Cannizzaro reaction.

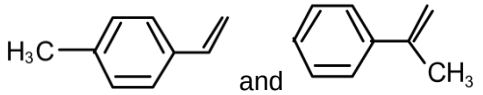
(i) 

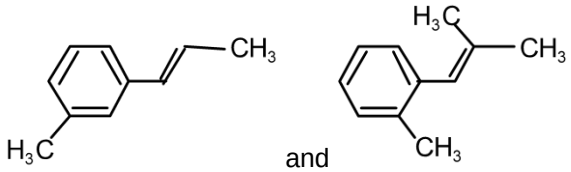
(ii) 

The options(s) with suitable combination of **P** and **R**, respectively, is(are) :**[JEE(Adv.)-2017, 4/122]**

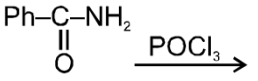
(A) 

(B) 

(C*) 

(D*) 

CARBOXYLIC ACID & DERIVATIVES

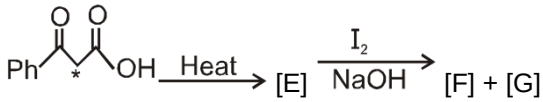
18. 
Product, mRikn

product is : mRikn gS %& **[IIT-JEE 2004, 3/84]**

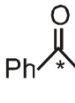
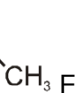
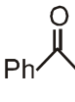
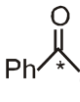
(A*) Benzonitrile (B) Benzamine (C) Chloro benzene (D) Aniline

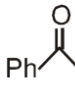
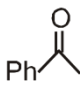
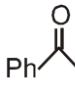
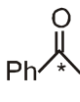
(A*) csUtksukbV ªkby (B) csUtkehu (C) DyksjkscsUthu (D) ,suhyhu

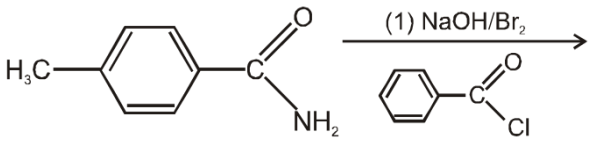
19. In the following reaction sequence, the correct structures of E, F and G are **[JEE 2008, 3/163]**



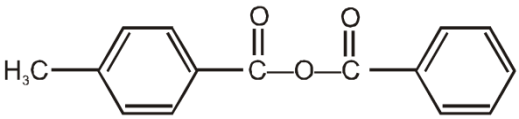
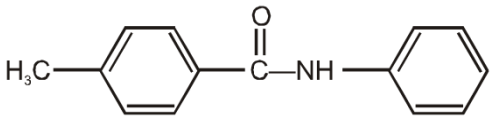
(*implies ^{13}C labelled carbon)

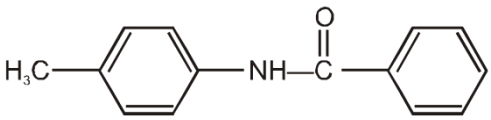
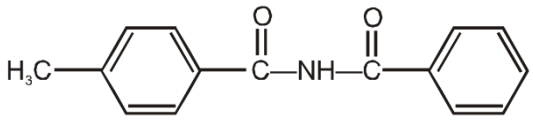
(A) E =  F =  G = CHI_3 (B) E =  F =  G = CHI_3

(C*) E =  F =  G = $\overset{*}{C}HI_3$ (D) E =  F =  G = CH_3I

20. In the reaction  T, the strucutre of the Product T is :

[JEE-2010,3/163]

(A)  (B) 

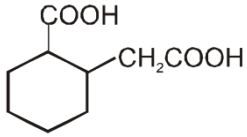
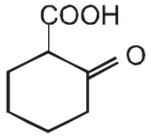
(C*)  (D) 

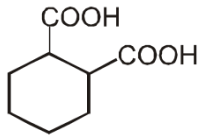
21. The carboxyl functional group (– COOH) is present in : **[JEE-2012]**

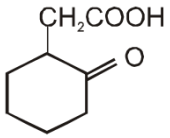
(A) picric acid (B) barbituric acid (C) ascorbic acid (D*) aspirin

22. The compound that undergoes decarboxylation most readily under mild condition is

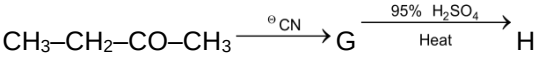
[IIT-JEE 2012, 3/136]

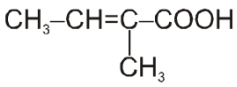
(A)  (B*) 

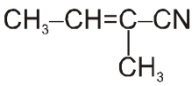
(C) 

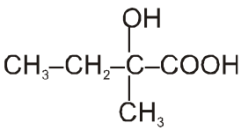
(D) 

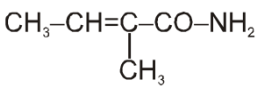
23. The major product H in the given reaction sequence is **[IIT-JEE 2012, 3/136]**



(A*) 

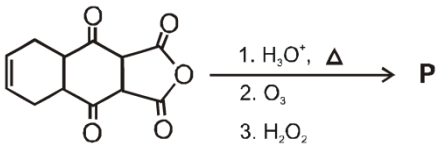
(B) 

(C) 

(D) 

24. The total number of carboxylic acid groups in the product **P** is

[JEE(Advanced)-2013, 4/120]



Answer Q.25, Q.26 and Q.27 by appropriately matching the information given in the three columns of the following table.

Columns 1, 2 and 3 contain starting materials, reaction conditions, and type of reactions, respectively.

Column 1	**Column 2**	**Column 3**
(I) Toluene	(i) $NaOH/Br_2$	(P) Condensation
(II) Acetophenone	(ii) Br_2/hv	(Q) Carboxylation
(III) Benzaldehyde	(iii) $(CH_3CO)_2O/CH_3COOK$	(R) Substitution
(IV) Phenol	(iv) $NaOH/CO_2$	(S) Haloform

25. The only CORRECT combination in which the reaction proceeds through radical mechanism is : **[JEE(Adv.)-2017, 3/122]**

(A) (IV) (i) (Q) (B) (III) (ii) (P) (C) (II) (iii) (R) (D*) (I) (ii) (R)

26. For the synthesis of benzoic acid, the only CORRECT combination is : **[JEE(Adv.)-2017, 3/122]**

(A*) (II) (i) (S) (B) (I) (iv) (Q) (C) (IV) (ii) (P) (D) (III) (iv) (R)

27. The only CORRECT combination that gives two different carboxylic acids is: **[JEE(Adv.)-2017, 3/122]**

(A) (IV) (iii) (Q) (B) (II) (iv) (R) (C) (I) (i) (S) (D*) (III) (iii) (P)

Additional Problems For Self Practice (APSP)

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions

1. The test is of **1 hour** duration.

2. The Test Booklet consists of **30** questions. The maximum marks are **120.**

3. Each question is allotted **4 (four)** marks for correct response.

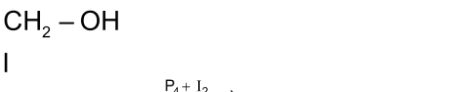
4. Candidates will be awarded marks as stated above in Instructions No. 3 for correct response of each question.
¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

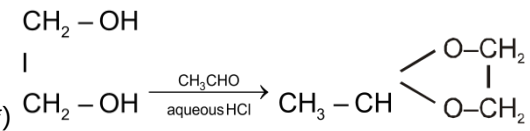
5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 4 above.

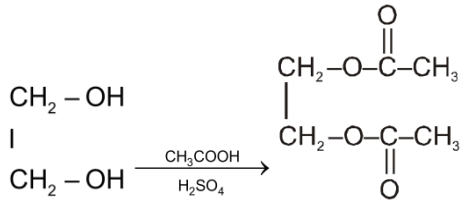
---

1. Which of the following reaction does not represent correct major product :

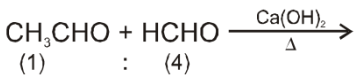
(1) 

(2) 

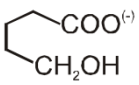
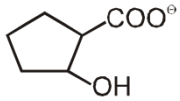
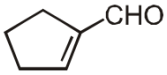
(3*) 

(4) 

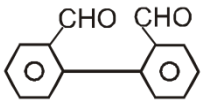
2. Aldehydes and ketones have lower boiling point than the corresponding alcohols because
(1) They have weaker dipole-dipole attraction
(2) They have weak van der waals forces
(3*) They cannot form hydrogen bonds with each other
(4) All of the above.

3.  Products of this reactions will be :
(1) $(CH_2OH)_3C–COO^-$ + $(CH_2OH)_3C–CH_2OH$ (2*) $(CH_2OH)_4C$ + $HCOO^-$
(3) CH_3COO^- + CH_3OH (4) $(CH_2OH)_3C–CHO$

4. Cyclohexene is treated with cold $KMnO_4$ followed by lead tetra acetate to give (A) when (A) is heated with $Ba(OH)_2$ the product obtained will be :

(1)  (2)  (3)  (4*) 

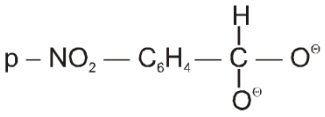
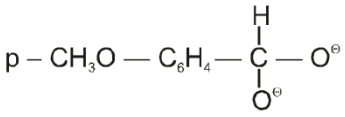
5. Which will exhibit Cannizaro reaction?

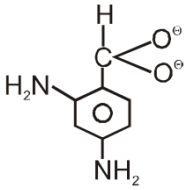
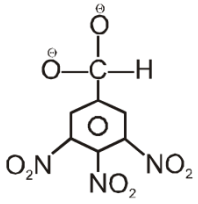
(1) Ph–COCHO (2)  (3)  (4*) All of these mijksDr lHkh

6. The compound which can undergo cross aldol with HCHO is :-

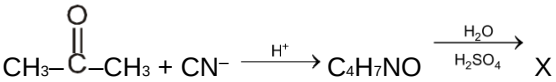
(1) PhCOCHO (2) Ph–CH=O (3*) CH_3NO_2 (4) Ph–CH=CH–CHO

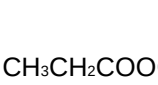
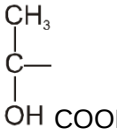
7. In a Cannizzaro reaction the intermediate which is the best hydride ion donor is :-

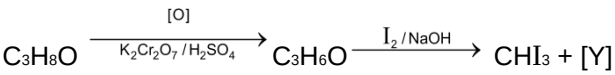
(1)  (2) 

(3*)  (4) 

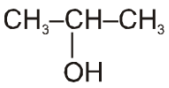
8. The product X in the reaction is -



(1) $CH_3CH_2COOCH_3$ (2)  (3*)  (4) CH_3–CH=CH–COOH

9. 

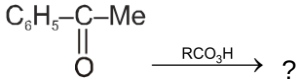
In this reaction the first compound is :

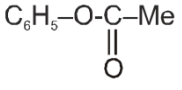
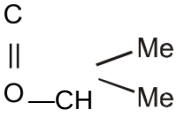
(1) CH_3–CH_2–CH_2–OH (2*)  (3) CH_3–O–CH_2–CH_3 (4) CH_3–CH_2–CHO

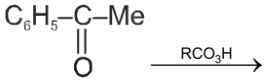
10. An organic compound (X) with molecular formula $C_5H_{10}O$ yield phenyl hydrazone and gives a negative response to the iodoform test and Tollen's test. It produces n-pentane on reduction. The compound could be:

(1) Pentanal (2) 2-pentanone (3*) 3-pentanone (4) amyl alcohol

11. What will be the product of the following reaction



(1*)  (2)  (3) PhCH(Me)OCOOMe (4) None of these



12. 

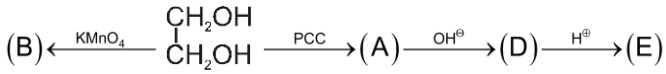
Select the incorrect statement.

(1) (D) is 

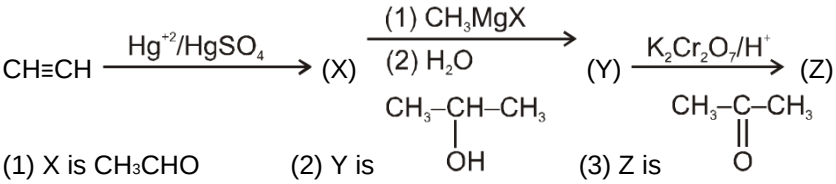
(2*) (B) & (E) are same compounds

(3) (A) is 

(4) (E) On oxidation gives (B)

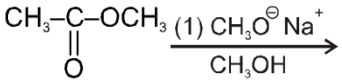


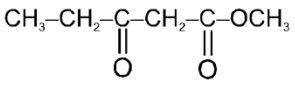
13. For the given reaction which option is wrong

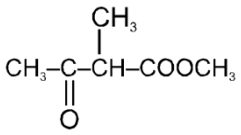


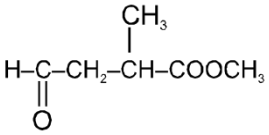
(1) X is CH_3CHO (2) Y is (3) Z is (4*) Z is CH_3COOH

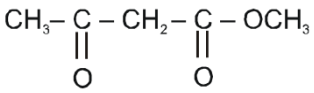
14. In the given reaction the product is : (nh xbZ vfHkfØ;k esa mRikn gS %)



(1) 

(2) 

(3) 

(4*) 

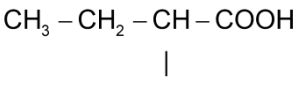
15. A mixture of benzaldehyde and formaldehyde on heating with aqueous NaOH solution gives :

(1*) Benzyl alcohol and sodium formate (2) Sodium benzoate and methyl alcohol

(3) Sodium benzoate and sodium formate (4) Benzyl alcohol and methyl alcohol

[JEE 2001, 1/35]

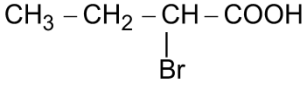
Carboxylic Acid and Derivatives

16. $CH_3–CH_2–CH_2–COOH \xrightarrow{Red\ P + Br_2}$ 

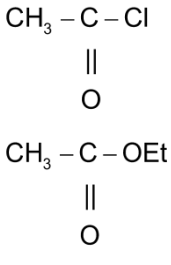
This reaction is called

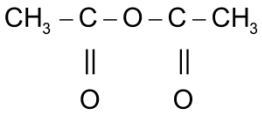
(1) Cannizzaro reaction (2) Schmit reaction

(3*) Hell Volhard Zelinsky reaction (4) Reimer tiemann reaction

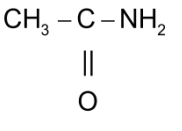
$CH_3–CH_2–CH_2–COOH \xrightarrow{Red\ P + Br_2}$ 

17. Which of the following compound takes maximum time for hydrolysis reaction.

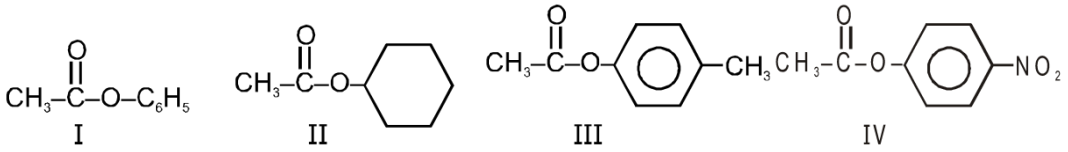
(1) 

(2) 

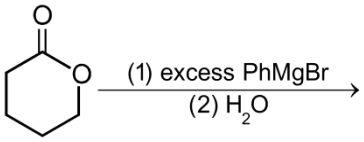
(3)

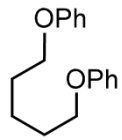
(4*) 

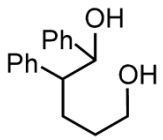
18. List the following esters in order of decreasing reactivity in the second step of a nucleophilic acyl substitution reaction .

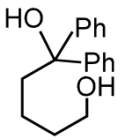


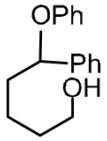
(1*) IV > I > III > II (2) IV > III > I > II (3) III > IV > I > II (4) II > I > III > IV

19.  X , X is gS

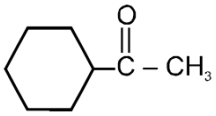
(1) 

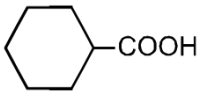
(2) 

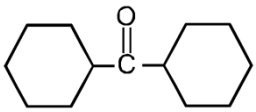
(3*) 

(4) 

20.  R, compound R is

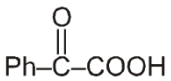
(1) 

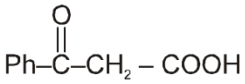
(2*) 

(3) 

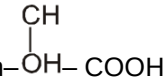
(4) 

21. Among the following, the acid which undergoes fastest decarboxylation is

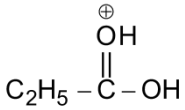
(1) 

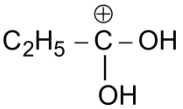
(2*) 

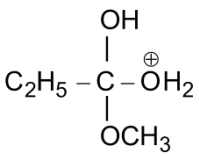
(3) PhCOOH

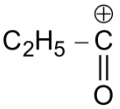
(4) 

22. In the esterification of propanoic acid with methanol in the presence of a mineral acid, which is not the expected intermediate species ?

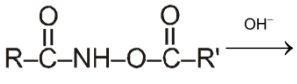
(1) 

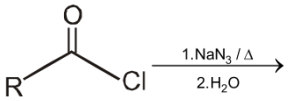
(2) 

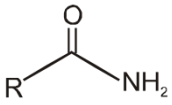
(3) 

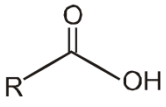
(4*) 

23. Select the correct name for the given reactions :

(i)  $R-NH_2$ (p) Curtius reaction

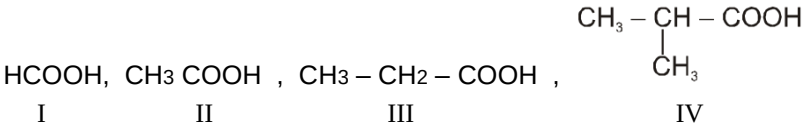
(ii)  $R-NH_2$ (q) Hoffmann's reaction

(iii)  $+ Br_2$ $R-NH_2$ (r) Schmidt reaction

(iv)  $+ N_3H \xrightarrow{H_2O} R-NH_2$ (s) Lossen rearrangement

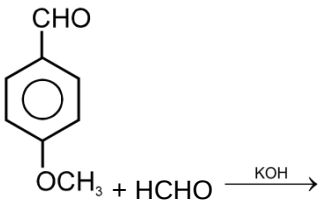
(1*) i-s; ii-p; iii-q; iv-r (2) i-p; ii-s; iii-q; iv-r (3) i-s; ii-p; iii-r; iv-q (4) i-s; ii-q; iii-p; iv-r

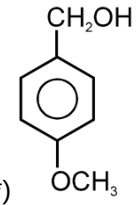
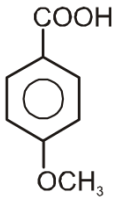
24. Which of the following is correct order of esterification of following acids with CH_3OH :

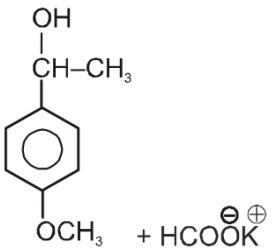


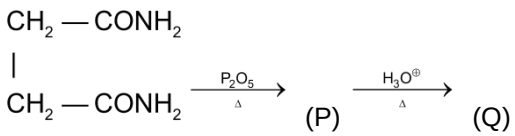
I II III IV

(1) I = II = III = IV (2*) I > II > III > IV (3) I < II < III < IV (4) I > IV > III > II

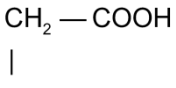
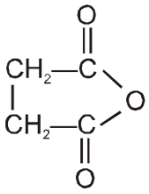
25.  $+ HCHO \xrightarrow{KOH}$ (A) + (B); major products are :

(1*)  (2)  $+ CH_3OH$

(3)  (4) (1) and (2) both

26. 

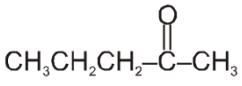
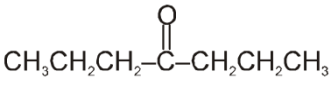
The product (Q) is

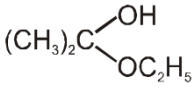
(1) $CH_3–CH_2–COOH$ (2)  (3*)  (4) $CH_3–COOH$

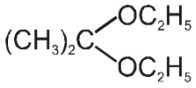
27. Which one of the following on treatment with 50% aq. NaOH yields the corresponding alcohol and acid : **[AIPMT 2007]**

(1*) C_6H_5CHO (2) $CH_3CH_2CH_2CHO$ (3) CH_3COCH_3 (4) CH_3CHO

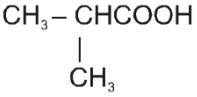
28. Acetone is treated with excess of ethanol in the presence of hydrochloric acid. The product obtained is : **[AIPMT 2012]**

(1)  (2) 

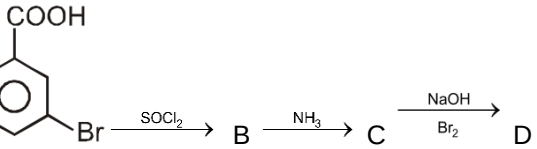
(3)  Hemiacetal

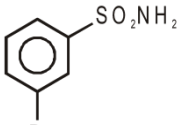
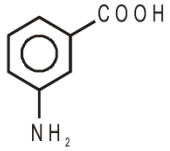
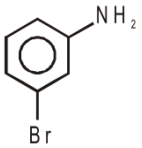
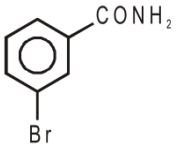
(4*)  Acetal

29. An organic compound 'A' on treatment with NH_3 gives 'B' which on heating gives 'C', 'C' when treated with Br_2 in the presence of KOH produces ethylamine. Compound 'A' is : **[AIPMT 2011]**

(1) CH_3COOH (2) $CH_3\ CH_2\ CH_2\ COOH$ (3)  (4*) $CH_3\ CH_2\ COOH$

30. In a set of reactions m-bromobenzoic acid gave a product D. Identify the product D.**[AIPMT 2011]**



(1)  (2)  (3*)  (4) 

Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART - II : PRACTICE QUESTIONS

1. At higher temperature, iodoform reaction is given by dilute alkaline solution of : **[AIIMS 2003]**
(1) $CH_3CO_2CH_3$ (2*) $CH_3CO_2C_2H_5$ (3) $C_6H_5CO_2CH_3$ (4) $CH_3CO_2C_6H_5$

2. The reagent used for the separation of acetaldehyde from acetophenone is : **[AIIMS 2004]**
(1*) $NaHSO_3$ (2) $C_6H_5NHNH_2$ (3) NH_2OH (4) NaOH-I_2

3. Methyl acetate and ethyl acetate can be distinguished by : **[AIIMS 2007]**
(1) hot alkaline $KMnO_4$ (2) Neutral $FeCl_3$ (3*) Iodoform test (4) None of the above

4. 3-hydroxy butanal is formed when X-reacts with Y in dilute Z solution. What are X, Y and Z ? **[AIIMS 2008]**

X Y Z
(1) CH_3CHO, $(CH_3)_2CO$, NaOH
(2) CH_3CHO, $(CH_3)_3COH$, NaCl
(3) $(CH_3)_2CO$, $(CH_3)_2CO$, HCl
(4*) CH_3CHO, CH_3CHO, NaOH

5. An organic compound X on treatment with pyridinium chloro chromate in dichloromethane gives compound Y. Compound Y reacts with I_2 and alkali to form triiodomethane. The compound 'X' is **[AIIMS 2008]**

6. If heavy water is taken as solvent instead of normal water while performing Cannizaro reaction, the products of the reaction are **[AIIMS 2009]**
(1) $RCOO^- + RCH_2OH$ (2*) $RCOO^- + RCH_2OD$ (3) $RCOOD + RCD_2OD$ (4) $RCOO^- + RCD_2OD$

7. $(CH_3)_2C=O + HCN \xrightarrow{H^+} \xrightarrow{H_3O^+} \xrightarrow[\Delta]{(i)\,H_2SO_4} \xrightarrow[(ii)\,H_2O_2,\,OH^-]{(i)\,BH_3-THF}$ product mRikn
The final predominant product is : **[AIIMS 2010]**

(1*) $HOCH_2-CH(CH_3)-COOH$

(2) $CH_3-C(OH)(CH_3)-COOH$

(3) $CH_3-CH(OH)-CH_3$

(4) $CH_3-CH_2-C(=O)-COOH$

8. The product formed in aldol reaction is : **[AIPMT 2007]**

(1*) a β-hydroxy aldehyde or ketone (2) an α-hydroxy aldehyde or ketone
(3) an α, β-unsaturated ester (4) a β-hydroxy acid

9. A strong base can abstract an α-hydrogen from : **[AIPMT 2008]**
(1*) Ketone (2) Alkane (3) Alkene (4) Amine

10. Clemmensen reduction of a ketone is carried out in the presence of which of the following ? **[AIPMT 2011]**
(1) Glycol with KOH (2*) Zn-Hg with HCl (3) Li Al H_4 (4) H_2 and Pt as catalyst

11. Which one is a nucleophilic substitution reaction among the following ? **[AIPMT 2011]**

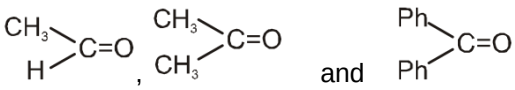
(1) $CH_3–CH=CH_2 + H_2O \xrightarrow{H^+} CH_3 – \underset{\displaystyle OH}{\underset{|}{CH}} – CH_3$

(2) $RCHO + R'MgX \longrightarrow R – \underset{\displaystyle OH}{\underset{|}{CH}} – R'$

(3*) $CH_3 – CH_2 – \underset{\displaystyle CH_3}{\underset{|}{CH}} – CH_2Br \longrightarrow CH_3 – CH_2 – \underset{\displaystyle CH_3}{\underset{|}{CH}} – CH_2NH_2$

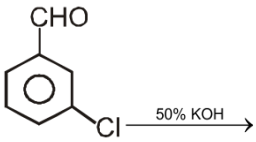
(4) $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN$

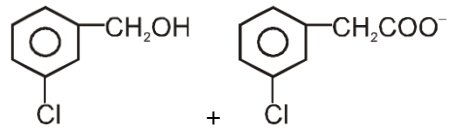
12. The order of reactivity of phenyl magnesium bromide (PhMgBr) with the following compounds : **[AIPMT 2011]**

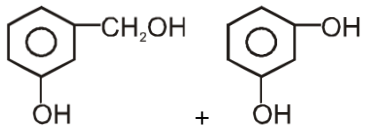


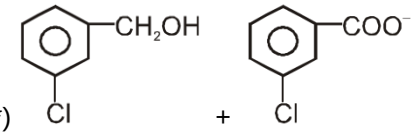
I II and III

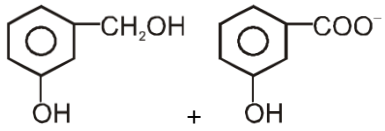
13. Predict the product in the given reaction. **[AIPMT 2012]**



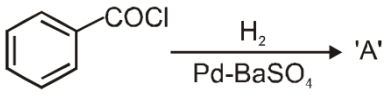
(1) 

(2) 

(3*) 

(4) 

14. Consider the following reaction :

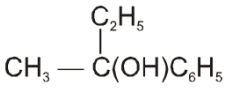


The product 'A' is : **[AIPMT 2012]**
(1*) C_6H_5CHO (2) C_6H_5OH (3) $C_6H_5COCH_3$ (4) C_6H_5Cl

15. In a set of the given reactions, acetic acid yields a product C. **[AIPMT 2003]**

$CH_3COOH \xrightarrow{PCl_5} A \xrightarrow[AlCl_3]{C_6H_6} B \xrightarrow[Ether]{C_2H_5MgBr\,/\,H_3O^{\oplus}} C$

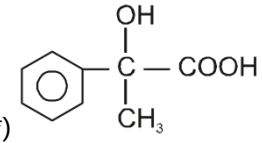
product C would be :

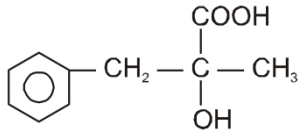
(1) $CH_3CH(OH)C_2H_5$ (2) $CH_3COC_6H_6$ (3) $CH_3CH(OH)C_6H_5$ (4*) 

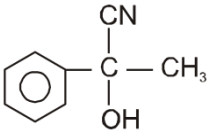
16. In a set of reactions acetic acid yielded a product D **[AIPMT 2005]**

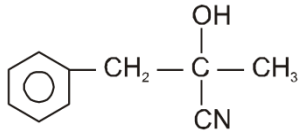
$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[Anhy.\,AlCl_3]{Benzene} B \xrightarrow{HCN} C \xrightarrow{H_3O^{\oplus}} D$

The structure of D would be :

(1*) 

(2) 

(3) 

(4) 

17. In the following sequence of reactions

$CH_3–Br \xrightarrow{KCN} A \xrightarrow{H_3O^{\oplus}} B \xrightarrow[ether]{LiAlH_4} C$, the end product (C) is : **[AIPMT 2012]**

(1) Acetone (2) Methane (3) Acetaldehyde (4*) Ethyl alcohol

18. In which of the following compounds the methylene hydrogens are the most acidic ?

(1) $CH_3COCH_2CH_3$ (2) $CH_3CH_2COOC_2H_5$ (3) $CH_3CH_2CH(COOC_2H_5)_2$ (4*) CH_3COCH_2CN.

19. 2-pentanone can be distinguished from 3- pentanone by the reagent ?

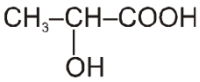
(1) 2, 4- Dinitrophenyl hydrazine (2)Tollen's reagent

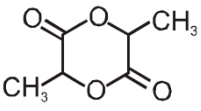
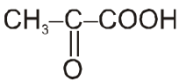
(3*) I_2 and dilute NaOH (4) $NaHSO_3$

20. Which of the following does not give benzoic acid salt on oxidation with hot alkaline $KMnO_4$.

(1) $Ph–CH_3$ (2) $Ph–CH=CH–CH_3$ (3) $Ph–C\equiv C–CH_3$ (4*) $Ph–C(CH_3)_3$

21. Identify final product in the following reaction

 $\xrightarrow{\Delta}$ product

(1*)  (2) CH_2= CH–COOH (3)  (4) $CH_3–CH_2–OH$

22. In the following reaction, C_2H_5OH acts as :

$C_2H_5OH + CH_3COOH \xrightarrow[-H_2O]{Conc.H_2SO_4} CH_3COOC_2H_5$

(1) electrophile (2*) nucleophile (3) dehydrating agent (4) All of the above

23. Which of the following reaction of alkanols does not involve C–O bond breaking

(1) $CH_3CH_2OH + SOCl_2$ (2) $CH_3CH(OH)CH_3 + PBr_3$

(3*) $CH_3CH_2OH + CH_3COOH$ (4) ROH + HX