EXERCISE-01 CHECK YOUR GRASP

SELECT THE CORRECT ALTERNATIVE (ONLY ONE CORRECT ANSWER)

1. Acids have much higher boiling points than isomeric esters because :-

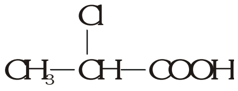
(A) Acids form dimers by H–Bonding

(B) Acids are volatile in steam

(C) Ester are non–volatile

(D) Acids can ionise to give protons in aqueous solution

2. Which of the following acids have the lowest pK_a value :-

(A) 

$CH_3-\overset{\overset{Cl}{|}}{C}H-COOH$

(B) $Cl-CH_2-CH_2-COOH$

(C) CCl_3COOH

(D) $CHCl_2COOH$

3. The reaction of an amide with bromine and alkali to form a primary amine is called :-

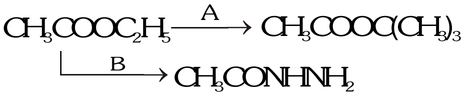
(A) Hunsdiecker reaction

(B) Hofmann mustard oil reaction

(C) Hoffmann degradation of amides

(D) Hell–Volhard–Zelinski reaction

4. The regents A and B in the reaction sequence



$CH_3COOC_2H_5 \xrightarrow{A} CH_3COOC(CH_3)_3$

$CH_3COOC_2H_5 \xrightarrow{B} CH_3CONHNH_2$

are given by the set :-

(A) Isopropyl alcohol, hydrazine

(B) Isopropyl alcohol, hydroxylamine

(C) t-butyl alcohol, hydrazine

(D) t-butyl alcohol, hydroxylamine

5. The carboxylic acids react with hydrazoic acid in presence of H_2SO_4 to form a primary amine. This reaction is called as :-

(A) Curtius rearrangement

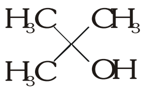
(B) Lossen rerrangement

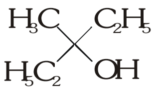
(C) Schmidt reaction

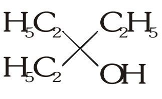
(D) Schotten-Boumann reaction

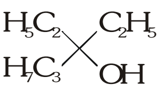
6. Ethyl acetate $\xrightarrow[\text{Excess}]{CH_3MgBr} \xrightarrow{H_3O^+}$ P

The product P will be :-

(A) 

(B) 

(C) 

(D) 

7. HVZ reaction is specific for –

(A) Replacement of β–hydrogens

(B) Replacement of α–hydrogens

(C) Replacement of β– carbons

(D) Replacement of α– carbons

8. Decreasing order of acidity of p-methoxy benzoic acid (A), p-nitrobenzoic acid (B) and benzoic acid (C) is–

(A) B, C, A

(B) A, B, C

(C) C, A, B

(D) None

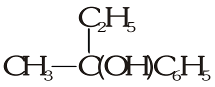
9. Benzoic acid reacts with $Ca(OH)_2$. The product obtained on dry distillation gives–

(A) Benzophenone (B) Acetophenone (C) Benzaldehyde (D) None of these

10. In a set of the given reactions, acetic acid yielded a product C.

$$CH_3COOH+PCl_5 \longrightarrow A \xrightarrow[AlCl_3]{C_6H_6} B \xrightarrow[\text{(ii) } H_3O^{\oplus}]{\text{(i) } C_2H_5MgBr/\text{ether}} C$$; product C would be:-

(A) $CH_3CH(OH)C_2H_5$ (B) $CH_3COC_6H_5$ (C) $CH_3CH(OH)C_6H_5$ (D)



$CH_3-\overset{\displaystyle C_2H_5}{\overset{|}{C}}(OH)C_6H_5$

11. The correct reactivity order with the nucleophile is :

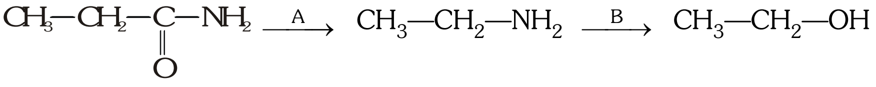
(A) $CH_3COCl > CH_3CONH_2 > CH_3COOCH_3$

(B) $CH_3COCl > CH_3COOCH_3 > CH_3CONH_2$

(C) $CH_3CONH_2 > CH_3COOCH_3 > CH_3COCl$

(D) $CH_3COOCH_3 > CH_3COCl > CH_3CONH_2$

12.



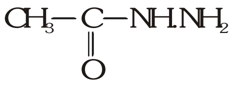
$$CH_3-CH_2-\underset{\underset{\displaystyle O}{\|}}{C}-NH_2 \xrightarrow{A} CH_3-CH_2-NH_2 \xrightarrow{B} CH_3-CH_2-OH$$

In the above sequence A & B respectively are -

(A) Br_2/KOH, NaOH (B) Br_2/KOH, HNO_2 (C) $KMnO_4$, KOH (D) HNO_2, Br_2 / KOH

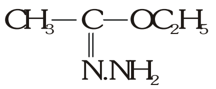
13. Ethyl acetate on treatment with hydrazine gives -

(A)



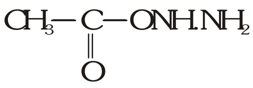
$CH_3-\underset{\underset{\displaystyle O}{\|}}{C}-NH.NH_2$

(B)



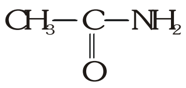
$CH_3-\underset{\underset{\displaystyle N.NH_2}{\|}}{C}-OC_2H_5$

(C)



$CH_3-\underset{\underset{\displaystyle O}{\|}}{C}-ONH.NH_2$

(D)



$CH_3-\underset{\underset{\displaystyle O}{\|}}{C}-NH_2$

14. Among the following, which is the strongest acid?

(A) $CHF_2-CH_2-CH_2-COOH$ (B) $CH_3-CH_2-CF_2-COOH$

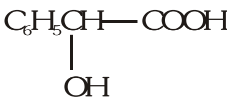
(C) $CH_2F-CHF-CH_2-COOH$ (D) $CH_3-CF_2-CH_2-COOH$

15. In the Rosenmund reduction, the catalyst used is:

(A) Pd/ $BaSO_4$ (B) Raney Ni (C) Sn/HCl (D) Zn/HCl

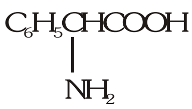
16. Which of the following carboxylic acids undergoes decarboxylation easily?

(A) $C_6H_5COCH_2COOH$ (B) $C_6H_5COCOOH$ (C)



$C_6H_5\underset{\underset{\displaystyle OH}{|}}{CH}-COOH$

(D)



$C_6H_5\underset{\underset{\displaystyle NH_2}{|}}{CH}COOH$

17. The reactivities of acid halides (I), anhydrides (II), esters (III) and amides (IV) with nucleophilic reagents follow the order

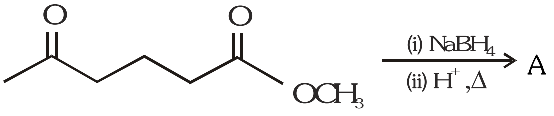
(A) I > II > III > IV (B) IV > III > II > I (C) I > III > II > IV (D) III > II > I > IV

18. In the following sequence of reactions

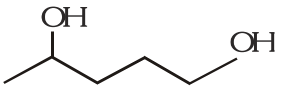
the product (B) is:

(A) $PhCOCH_2CH_3$ (B) $PhCHOHCH_2CH_3$ (C) $PhCH_2CH_2CH_3$ (D) $PhCH=CHCH_3$

19. Consider the following reaction.



The product (A) is :

(A)


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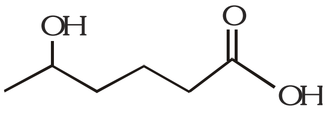

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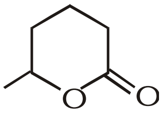

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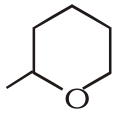


20. Which of the following orders regarding the base strength of a leaving group in a reaction of an acid derivative with a nucleophile is correct :

(A) $Cl^1 > RCOO^1 > RO^1$
(B) $Cl^1 > RO^1 > RCOO^1$
(C) $RO^1 > RCOO^1 > Cl^1$
(D) $RO^1 > Cl^1 > RCOO^1$

21. The correct sequence of decreasing order of reactivity of hydrolysis of acid chlorides is :

(A) $PhCOCl > p\text{-}O_2NC_6H_4COCl > p\text{-}CH_3OC_6H_4COCl$
(B) $PhCOCl > p\text{-}CH_3OC_6H_4COCl > p\text{-}O_2NC_6H_4COCl$
(C) $p\text{-}O_2NC_6H_4COCl > PhCOCl > p\text{-}CH_3OC_6H_4COCl$
(D) $p\text{-}O_2NC_6H_4COCl > p\text{-}CH_3OC_6H_4COCl > PhCOCl$

22. Kolbe electrolysis of potassium succinate gives CO_2 and .... :

(A) C_2H_6 and KOH
(B) C_2H_2 and KOH
(C) C_2H_4, KOH and H_2
(D) CH_4, C_2H_6 and C_2H_4

23. In the following reaction identify compounds A, B, C and D :

$PCl_5 + SO_2 \longrightarrow A + B$;
$A + CH_3COOH \longrightarrow C + SO_2 + HCl$
$2C + (CH_3)_2\,Cd \longrightarrow D + CdCl_2$

(A) $SOCl_2$, $POCl_3$, CH_3COCl, CH_3COCH_3
(B) $SOCl_2$, HCl, CH_3Cl, CH_3CHO
(C) SO_2, Cl_2, C_2H_5Cl, CH_3COCH_3
(D) None of these

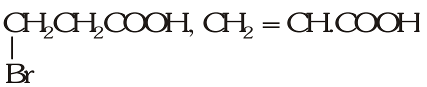
24. What are A and B in the following sequence of reactions :

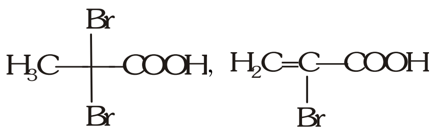
(i) $CH_3CH_2COOH \xrightarrow[Br_2]{P} A$; (ii) $A \xrightarrow[(ii)H^+]{(i)Alc.KOH\,excess} B$

(A)

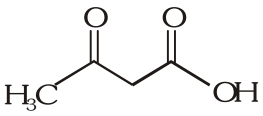
$CH_3\text{—}\underset{\displaystyle Br}{\underset{|}{C}H}.COOH,\ CH_2 = CHCOOH$

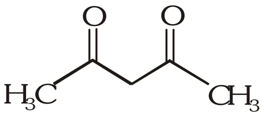
(B) CH_3CH_2COBr, $CH_2 = CHCOOH$

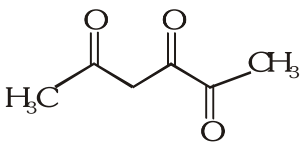
(C)

$\underset{\displaystyle Br}{\underset{|}{C}H_2}CH_2COOH,\ CH_2 = CH.COOH$

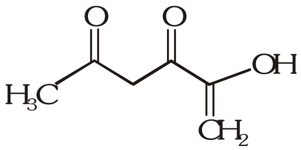
(D)

$H_3C\text{—}\overset{\displaystyle Br}{\underset{\displaystyle Br}{\overset{|}{\underset{|}{C}}}}\text{—}COOH,\ H_2C{=}\underset{\displaystyle Br}{\underset{|}{C}}\text{—}COOH$

25. Which of the following compound would be expected to decarboxylates when heated :-

(A) 

(B) 

(C) 

(D) 

CHECK YOUR GRASP

ANSWER KEY

EXERCISE -1

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	A	C	C	C	C	A	B	A	A	D	B	B	A	B	A	A	A	C	C	C
Que.	21	22	23	24	25															
Ans.	C	C	A	A	A															

SELECT THE CORRECT ALTERNATIVES (ONE OR MORE THEN ONE CORRECT ANSWERS)

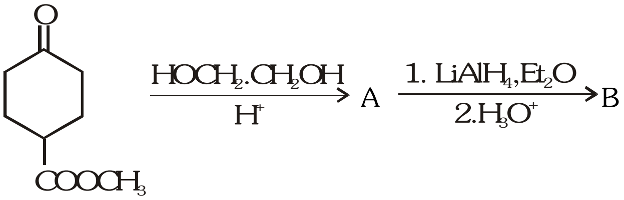
1. Which of the following reactions involve a decrease in the length of the carbon chain :-

(A) Schmidt reaction
(C) Hofmann's bromamide reaction
(C) Hell-Volhard-Zelinski reaction
(D) All of these

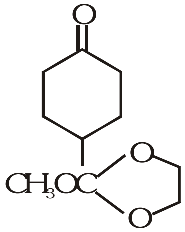
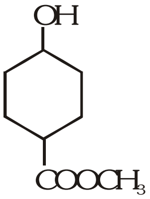
2. Dry distillation of a mixture of calcium formate and the calcium acetate gives –

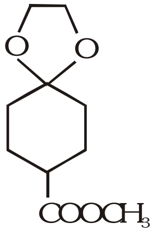
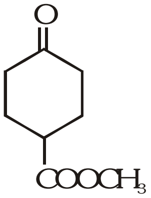
(A) HCHO
(B) CH_3CHO
(C) CH_3COCH_3
(D) None

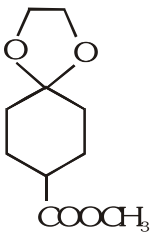
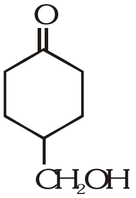
3. Consider the following sequence of reactions.

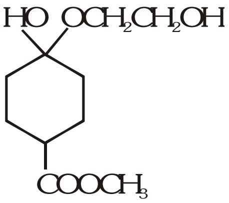
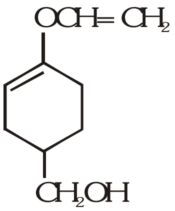


The products (A) and (B) are, respectively,

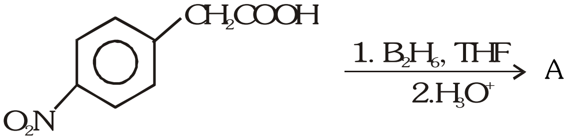
(A)  and 

(B)  and 

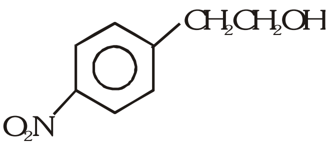
(C)  and 

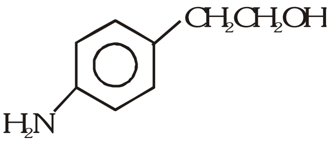
(D)  and 

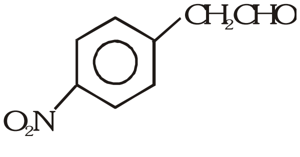
4. Consider the following reaction.

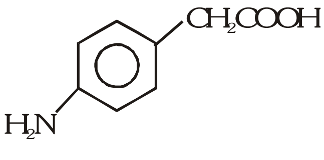


The product (A) is

(A) 

(B) 

(C) 

(D) 

5. Which of the following methods are used for the conversion of carboxylic acids into acid chlorides ($RCOOH \longrightarrow RCOCl$) ?

(A) $RCOOH + SOCl_2 \longrightarrow$ (B) $RCOOH + PCl_5 \longrightarrow$

(C) $RCOOH + Cl_2 \longrightarrow$ (D) $RCOOH + P + Cl_2 \longrightarrow$

6. Which of the following statements are correct for benzoic acid ?

(A) Nitration gives o-and p-nitrobenzoic acid.

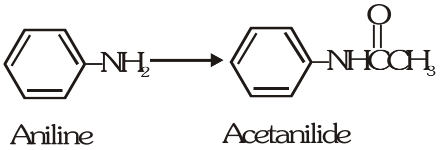
(B) Bromination ($Br_2/FeBr_3$) gives m-bromobenzoic acid.

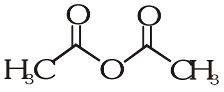
(C) The Friedel-Crafts reaction with $CH_3COCl/AlCl_3$ gives m-carboxyacetophenone.

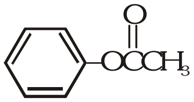
(D) The reaction with concentrated sulphuric acid gives 3-carboxybenzenesulphonic acid.

7. Which of the following compounds react with aniline to give acetanilide :

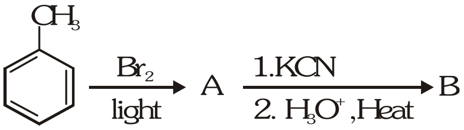
Which of the following compounds react with aniline to give acetanilide.

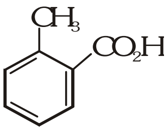


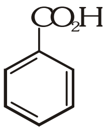
(A) CH_3COCl (B) 

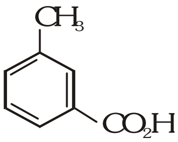
(C) CH_3CHO (D) 

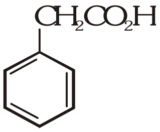
8. What is the final product (B) of this sequence :



(A) 

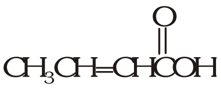
(B) 

(C) 

(D) 

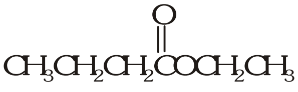
9. What is compound Z :

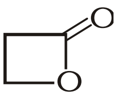
$$CH_3CH_2CH_2Br \xrightarrow{NaCN} X \xrightarrow{H_3O^+} Y \xrightarrow[H^+]{CH_3CH_2OH} Z$$

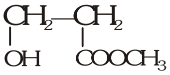
(A) 
$CH_3CH{=}CHCOOH$ (with $\overset{O}{\parallel}$ on C)

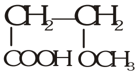
(B) $CH_3CH_2CH_2CH{=}NOCH_2CH_3$

(C) $CH_3CH_2CH_2CH(OCH_2CH_3)_2$

(D) 
$CH_3CH_2CH_2\overset{O}{\overset{\parallel}{C}}OCH_2CH_3$

10.  $\xrightarrow{CH_3OH}$ A , A is :

(A) 
$\underset{OH}{CH_2}-\underset{COOCH_3}{CH_2}$

(B) 
$\underset{COOH}{CH_2}-\underset{OCH_3}{CH_2}$

(C) Both are correct (D) None is correct

11. Which of the following orders of acid strength is correct :

(A) $RCOOH > ROH > HOH > HC{\equiv}CH$ (B) $RCOOH > HOH > ROH > HC{\equiv}CH$

(C) $RCOOH > HOH > HC{\equiv}CH > ROH$ (D) $RCOOH > HC{\equiv}CH > HOH > ROH$

12. The relative order of esterification of alcohols is :-

(A) 1° < 2° < 3° (B) 1° > 2° > 3° (C) 1° > 3° > 2° (D) 1° < 3° < 2°

13. The treatment of CH_3CH_2COOH with chlorine in the presence of phosphorus gives :

(A) $CH_3CH_2COCH_3$ (B) $CH_3CH_2CH_2Cl$ (C) $CH_3CH(Cl)COOH$ (D) $ClCH_2CH_2COOH$

14. Which of the following sequences of rate of alkaline hydrolysis of esters is correct :

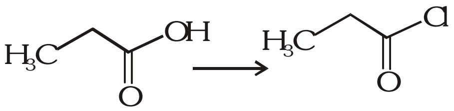
(A) $CH_3CH_2COOCH_3 < (CH_3)_2CHCOOCH_3 < (CH_3)_3CCOOCH_3$

(B) $CH_3CH_2COOCH_3 > (CH_3)_2CHCOOCH_3 > (CH_3)_3CCOOCH_3$

(C) $CH_3CH_2COOCH_3 > (CH_3)_2CHCOOCH_3 < (CH_3)_3CCOOCH_3$

(D) $CH_3CH_2COOCH_3 < (CH_3)_2CHCOOCH_3 > (CH_3)_3CCOOCH_3$

15. Which of the following is used to perform following transformation :



(A) $SOCl_2$ (B) PCl_5 (C) PCl_3 (D) SO_2Cl_2

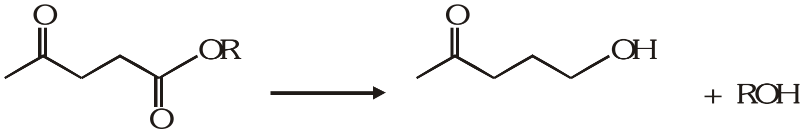
16. Which of the following does not give iodoform :

(A) Acetic acid (B) lactic acid (C) Actophenone (D) propionic acid

17. One can distinguish between HCOOH and CH_3COOH with :

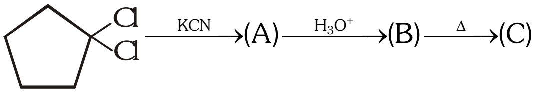
(A) $NaHCO_3$ (B) H_2SO_4 (C) tollens reagent (D) fehling's solution

18. Which of the following reagents are involved in the following transformation ?



(A) H_3O^+ (B) $LiAlH_4$ (C) Ethylene glycol (D) Acetone

19.



Identify the correct statement(s) about the above sequence of reactions :

(A) Compound (A) is formed through S_N reaction

(B) Compound (C) on reduction with $LiAlH_4$ forms a product which on dehydration given cyclohexene.

(C) compound (A) requires two moles of hydrogen for complete reduction.

(D) Compound (C) on Schmidt's reaction gives a product which reacts with HNO_2 to give (D) as major product. Compound (D) on dehydration gives cyclopentene

20. Which of the following on reduction with $LiAlH_4$ will give ethyl alcohol ?

(A) $(CH_3CO)_2O$ (B) CH_3COCl (C) CH_3CONH_2 (D) $CH_3COOC_2H_5$

BRAIN TEASERS

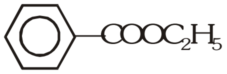
ANSWER KEY

EXERCISE -2

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	A,B	A,B,C	C	A	A,B,D	B,D	A,B,D	D	D	A	B	B	C	B	A,B,C
Que.	16	17	18	19	20										
Ans.	A,D	C,D	A,B,C	A,B,D	A,B,D										

EXERCISE–03 MISCELLANEOUS TYPE QUESTIONS

TRUE OR FALSE :

1.  cannot undergoes claisen condensation.
2. Heating of β-hydroxy acid gives lactones.
3. Hunsdiecker reaction involve free redical in intermediate steps.
4. Benzoic acid is stronger than methanoic acid but weaker than ethanoic acid.
5. Acid halides are more reactive than acid amides towards the hydrolysis.

FILL IN THE BLANKS :

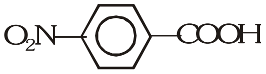
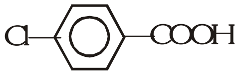
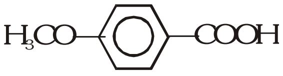
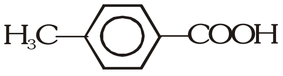
1. When sodium benzoate is heated with sodalime, it gives........................
2. pK_a and K_a of an acid are connected by the relation........................
3. Benzoic acid does not undergo Friedel-Crafts reaction due to ....of the benzene ring by the .... effect of –COOH group.
4. Hell-Volhard-Zelinsky reaction involves the replacement of an ....atom from the alkyl group of a monocarboxylic acid by a .... atom.
5. Carboxylic acids may be prepared by the reaction of Grignard reagents with ....

MATCH THE COLUMN

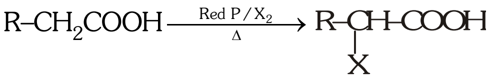
1. Match the column I with column II.

	Column-I (Reaction)		Column-II (Possible products)
(A)	Arndt Eistert synthesis	(p)	Carbanion
(B)	Hunsdiecker reaction	(q)	Carbocation
(C)	Claisen condensation	(r)	Ketene
(D)	Esterification reaction	(s)	Free radical

2. Match the column I with column II.

	Column-I (Acid)		Column-II (K_a)
(A)	Benzoic acid	(p)	3.3 Ч 10^{-5}
(B)		(q)	10.2 Ч 10^{-5}
(C)		(r)	30.6 Ч 10^{-5}
(D)		(s)	6.4 Ч 10^{-5}
(E)		(t)	4.2 Ч 10^{-5}

3. Match the column I with column II.

	Column-I		Column-II
(A)	Schimdt reaction	(p)	$RCOOH \xrightarrow[\Delta]{NaOH/CaO} RH$
(B)	Curtius reaction	(q)	 $R{-}CH_2COOH \xrightarrow[\Delta]{Red\ P/X_2} R{-}\underset{X}{\underset{\vert}{C}}H{-}COOH$
(C)	Decarboxylation	(r)	$RCOCl \xrightarrow[\Delta]{NaN_3} RNH_2$
(D)	HVZ reaction	(s)	$RCOOH \xrightarrow[\Delta]{N_3H} RNH_2$

ASSERTION & REASON QUESTION :

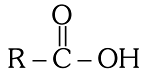
These questions contains, Statement-I (assertion) and Statement-II (reason).

(A) Statement-I is True, Statement-II is True ; Statement-II is a correct explanation for Statement-I

(B) Statement-I is True, Statement-II is True ; Statement-II is NOT a correct explanation for Statement-I

(C) Statement-I is True, Statement-II is False.

(D) Statement-I is False, Statement-II is True.

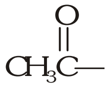
1. **Statement-I** : Unlike the >C=O group of aldehydes and ketones, the >C=O of  $R-\overset{\overset{O}{\|}}{C}-OH$ does not undergo nucleophilic addition reactions.

Because

Statement-II : Carboxylic acids exist as dimers due to intermolecular hydrogen bonding in aprotic medium.

2. **Statement-I** : $CH_3COCH_2COOC_2H_5$ will give iodoform test.

Because

Statement-II : It contains  $CH_3\overset{\overset{O}{\|}}{C}-$ group linked to a carbon atom.

3. **Statement-I** : Acetic acid does not undergo haloform reaction.

Because

Statement-II : Acetic acid has no α hydrogen.

4. **Statement-I** : Benzoic acid on nitration will give m– Nitro benzoic acid.

Because

Statement-II : –COOH group will increase e^- density on meta position.

5. **Statement-I** : Acyl halide are more reactive than acid substance amide towards nucleophillic substitution.

Because

Statement-II : X^- are better leaving group than $\overline{N}H_2$.

COMPREHENSION BASED QUESTIONS :

Comprehension # 1

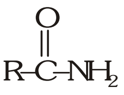
Amides undergo hydrolysis to yield carboxylic acid plus amine on heating in either aqueous acid or aqueous base. The conditions required for amide hydrolysis are more severe than those required for the hydrolysis of esters, anhydrides or acid chlorides, but the mechanism is similar (nucleophilic acyl substitution). Nucleophilic acyl substitutions involve a tetrahedral intermediate, hence these are quite different from alkyl substitution ($RCH_2Br \xrightarrow{NaCN} RCH_2CN$) which involves a pentavalent intermediate or transition state.

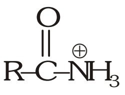
One of the important reactions of esters is their reaction with two equivalent of Grignard reagent to give tertiary alcohols.

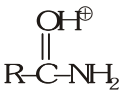
1. The mechanism involved during the hydrolysis of acid derivatives is :

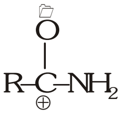
(A) elimination-addition
(B) addition-elimination
(C) nucleophilic addition elimination
(D) electrophilic addition elimination

2. Which of the following constitutes the best substrate during the acidic hydrolysis of amides ?

(A) 
$R-\overset{\overset{O}{||}}{C}-NH_2$

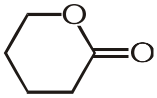
(B) 
$R-\overset{\overset{O}{||}}{C}-\overset{\oplus}{N}H_3$

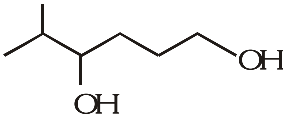
(C) 
$R-\overset{\overset{OH^{\oplus}}{||}}{C}-NH_2$

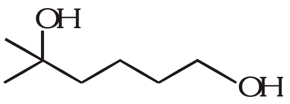
(D) 
$R-\underset{\oplus}{\overset{\overset{O}{|}}{C}}-NH_2$

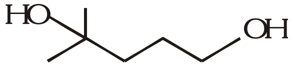
3. For which functional derivative of carboxylic acids, acidic hydrolysis is avoided?

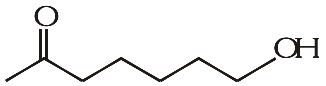
(A) Acid chlorides
(B) Acid amides
(C) Acid anhydrides
(D) Esters

4. When  is treated with two equivalent of methyl magnesium iodide and the product acidified the final product will be

(A) 

(B) 

(C) 

(D) 

Comprehension # 2

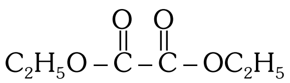
Ester gives nucleophilic addition reaction followed by elimination reaction with carbon nucleophile. When carbon nucleophile is of an ester then the reaction is known as Claisen condensation reaction. This reaction is also carried out between ester and a ketone. A successful Claisen condensation requires an ester with two α-hydrogens and an equivalent amount of base rather than a catalytic amount of base.

1. Consider the given reaction

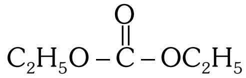
$$CH_3-COOC_2H_5 \xrightarrow[C_2H_5OH]{C_2H_5ONa} \text{enolate ion} \xrightarrow[\text{Claisen condensation}]{\text{ester(X)}} \text{Product}$$

For the above reaction the most reactive ester is:

(A) $C_6H_5COOC_2H_5$

(B) 
$C_2H_5O-\overset{\overset{O}{||}}{C}-\overset{\overset{O}{||}}{C}-OC_2H_5$

(C) $HCOOC_2H_5$

(D) 
$C_2H_5O-\overset{\overset{O}{||}}{C}-OC_2H_5$

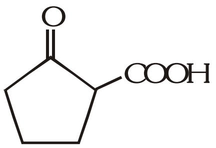
2. Intramolecular Claisen condensation given by diester is known as:

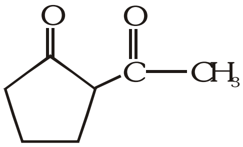
(A) Stobbe condensation
(B) Dieckmann condensation
(C) Mannich reaction
(D) Reformatsky reaction

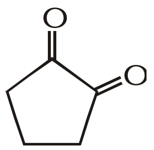
3. In the given reaction :

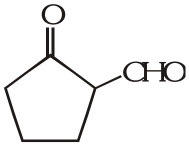
$$C_2H_5O-\overset{\overset{\large O}{||}}{C}-(CH_2)_3-CH_2-COOC_2H_5 \xrightarrow[\text{(ii) } H_2O/HCl]{\text{(i) } C_2H_5ONa/C_2H_5OH} [X]$$

[X] is :

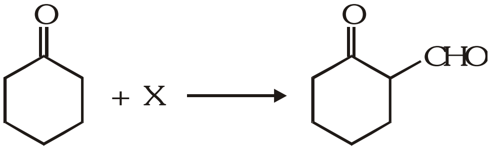
(A) 

(B) 

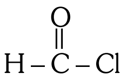
(C) 

(D) 

4. In the given reaction



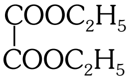
[X] is :

(A) 

$H-\overset{\overset{O}{||}}{C}-Cl$

(B) HCl + CO

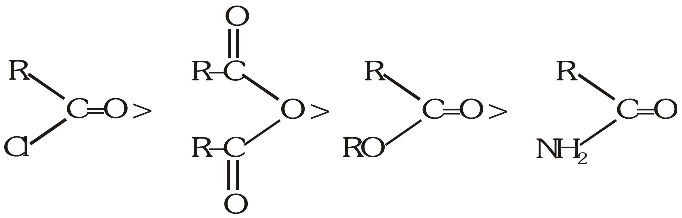
(C) $HCOOC_2H_5$

(D) 

$\begin{array}{l} COOC_2H_5 \\ | \\ COOC_2H_5 \end{array}$

Comprehension # 3

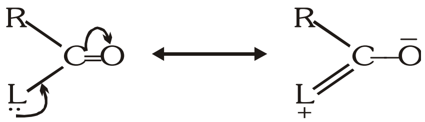
The reactivity of acid derivatives in general follows the order :



The above order of reactivity can be explained in terms of the :

(i) Basicity of leaving group (ii) Resonance effect (iii) Inductive effect

Weaker is the basic character of leaving group, more is the reactivity of acid derivative. In general, all the acid derivatives show resonance as follows:



More is the stabilization, lesser is the reactivity and *vice-versa*.

1. Which among the following anions is the most basic ?

(A) $\bar{N}H_2$ (B) $\bar{O}R$ (C) $R-CO\bar{O}$ (D) Cl^-

2. Which of the most reactive acid derivative?

(A) R–COCl (B) $(RCO)_2O$ (C) RCOOR (D) $RCONH_2$

3. Which among the following ester is most reactive towards nucleophilic attack ?

(A) CH_3COOCH_3 (B) $HCOOCH_3$ (C) $CH_3CH_2COOC_6H_5$ (D) All are equally reactive

4. Acid derivatives although contain  $-\overset{\overset{\displaystyle O}{\|}}{C}-$ group, yet do not undergo the usual properties of carbonyl group. It is due to:

(A) inductive effect (B) resonance (C) eletromeric effect (D) all of these

5. Which of the following compounds will be most easily hydrolysed ?

(A) Acid halide (B) Acid amide (C) Ester (D) Acid anhydride

MISCELLANEOUS TYPE QUESTION

ANSWER KEY

EXERCISE -3

- *True / False*

  1. T 2. F 3. T 4. F 5. T

- *Fill in the Blanks*

  1. Benzene
  2. $pk_a = -\log k_a$
  3. deactivation , electron withdrawing
  4. α - Hydrogen, halogen
  5. CO_2

- *Match the Column*

  1. (A) → r ; B → s ; (C) → p ; (D) → q
  2. (A) → s ; (B) → r ; (C) → q ; (D) → p ; (E) → t
  3. (A) → s ; (B) → r ; (C) → p ; (D) → q

- *Assertion - Reason Questions*

  1. C 2. D 3. C 4. C 5. A

- *Comprehension Based Questions*

  Comprehension #1 : 1. (C) 2. (C) 3. (A) 4. (B)
  Comprehension #2 : 1. (B) 2. (B) 3. (A) 4. (C)
  Comprehension #3 : 1. (A) 2. (A) 3. (B) 4. (B) 5. (A)

EXERCISE–04 [A] CONCEPTUAL SUBJECTIVE EXERCISE

1. Carbon-oxygen bond length in formic acid are 1.23 E and 1.36E but in sodium formate both the carbon-oxygen bonds have same value, i.e., 1.27E. Explain.

2. The second dissociation constant of fumaric acid is greater than maleic acid. Explain.

3. Which is stronger conjugate base in each pair ?

(A) $\bar{O}H$ or $N\bar{H}_2$ (B) $\bar{C}H_3$ or CH_3COO^- (C) $HCOO^-$ or CH_3COO^-

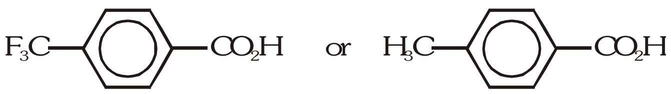
(D) CF_3COO^- or CCl_3COO^-

4. Which acid of each pair shown here would you expect to be stronger?

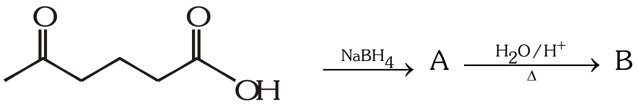
(A) CH_3CO_2H or CH_2FCO_2H

(B) CH_2ClCO_2H or CH_2BrCO_2H

(C) $CH_3CH_2CHFCO_2H$ or $CH_3CHFCH_2CO_2H$

(D) 

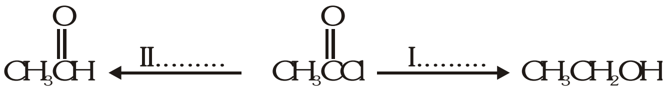
5. What are A and B in the following ?



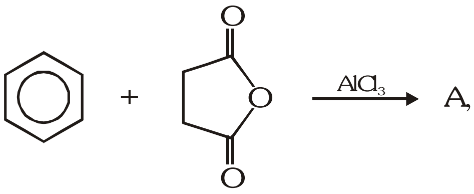
6. In the following reaction, trace the position of isotopic O^{18}.

$$CH_3-\overset{O}{\overset{\|}{C}}-O-H + CH_3CH_2-\overset{18}{O}-H \rightleftharpoons CH_3-\overset{O}{\overset{\|}{C}}-O-CH_2CH_3 + H_2O$$

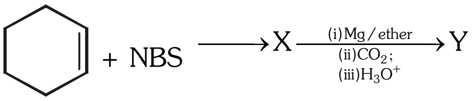
7. Write the reagents to carry out following conversions:



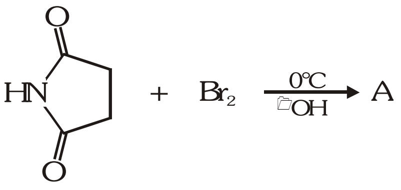
$$CH_3\overset{O}{\overset{\|}{C}}H \xleftarrow{II.........} CH_3\overset{O}{\overset{\|}{C}}Cl \xrightarrow{I.........} CH_3CH_2OH$$

8. 

What is A?

9. 

What are X and Y ?

10. 

Write down the structure of A? What is the use of A?

CONCEPTUAL SUBJECTIVE EXERCISE

ANSWER KEY

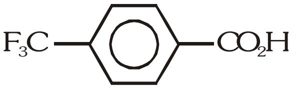
EXERCISE -4(A)

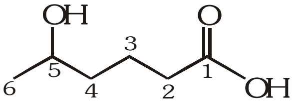
1. Formate in shows equivalent resonating structures while formic acid does not.

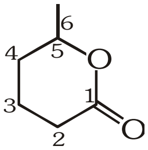
2. After the first dissociation, maleate ion is more stabilised due to intramolecular H-bonding, whereas fumarate ion does not have intramolecular H-bonding.

3. (A) NH_2^- (B) CH_3^- (C) CH_3COO^- (D) CCl_3COO^-

4 (A) CH_2FCO_2H (B) CH_2ClCO_2H

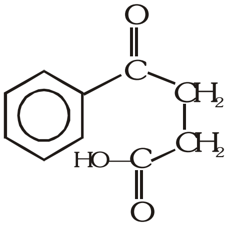
(C) $CH_3CH_2CHFCO_2H$ (D) 

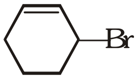
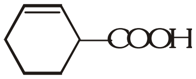
5. A :  ($NaBH_4$ reduces keto group)

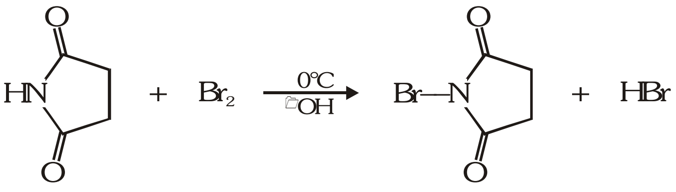
B :  (by intramolecular esterification)

6. $\overset{18}{O}$ is in ester  $CH_3\overset{\overset{O}{\|}}{C}OCH_2CH_3$

7. I : $LiAlH_4$ II : $Pd/BaSO_4$ (Rosenmund)

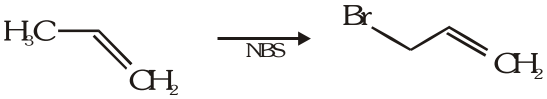
8. A is formed by Friedel-Crafts reaction A : 

9. X :  Y : 

10. 

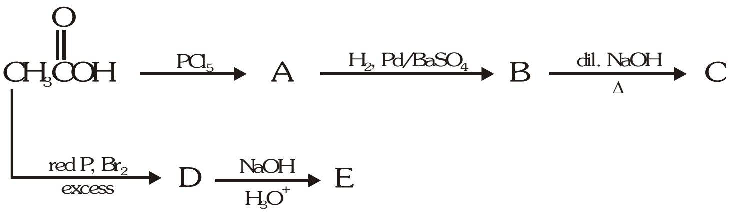
1-Bromopyrrolidine-2, 5-dione
or N-Bromosuccinimide (NBS)

It is used for brominating in allylic and benzylic hydrogen.

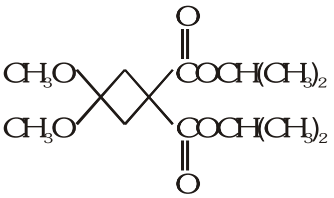


EXERCISE–04 [B] BRAIN STORMING SUBJECTIVE EXERCISE

1. Identify A, B, C, D and E in the following sequence of reactions:



2. When the compound shown was heated in refluxing hydrochloric acid, a compound with the molecular formula A($C_5H_6O_3$) was isolated. Identify this product. Along with this product, three other carbon-containing substances are formed. What are they ?

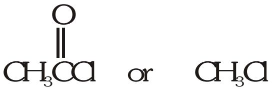


What happens when A($C_5H_6O_3$) reacts with

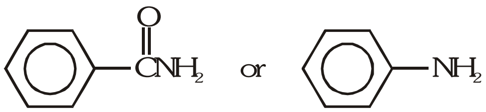
(A) HCN follwed by hydrolysis
(B) soda lime/Δ
(C) NH_2NH_2/glycol, OH^-
(D) P/Br_2
(E) N_3H

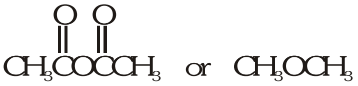
3. CH_3COO^- (acetate ion) is more stable than $C_2H_5O^-$ (ethoxide ion). Explain.

4. Which is more reactive in each pair towards S_N reaction ?

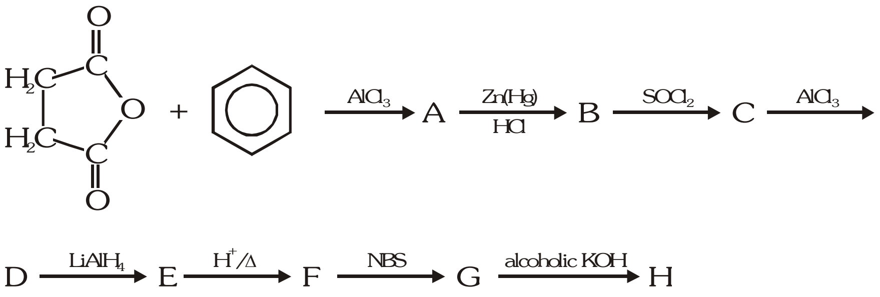
(A) 

$CH_3\overset{O}{\overset{\|}{C}}Cl$ or CH_3Cl

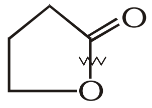
(B) 

(C) 

$CH_3\overset{O}{\overset{\|}{C}}O\overset{O}{\overset{\|}{C}}CH_3$ or CH_3OCH_3

5. 

Identify A to H.

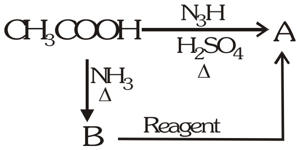
6.  reacts with :

γ-Butyrolactone (ester)

(A) NH_3
(B) $LiAlH_4$
(C) EtOH, H^+
(D) $NaBH_4$/EtOH

What are the product in each case ?

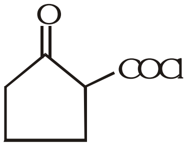
7. In case of aldehydes and ketones there is addition of nucleophile but in case of acyl compound there is nucleophilic substitution. Explain.

8. 

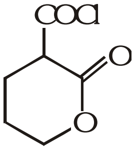
(i) What are A & B ?

(ii) Which reagent will convert B into A ?

9. What happens when?

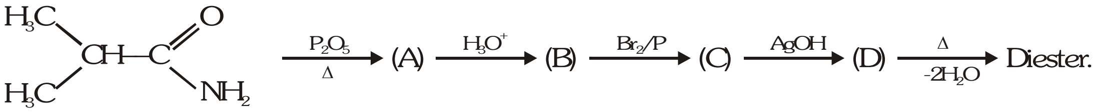
(i) 

is reduced by $LiAlH_4$.

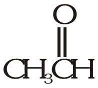
(ii) 

is reduced by using $LiAlH_4$ and by using Lindlar's catalyst.

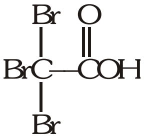
10. Complete the following sequence of reactions :



BRAIN STORMING SUBJECTIVE EXERCISE ANSWER KEY EXERCISE -4(B)

1. A : 
$CH_3\overset{\overset{O}{\|}}{C}Cl$
B : 
$CH_3\overset{\overset{O}{\|}}{C}H$
(Rosenmund)

C : $CH_3CH=CHCHO$ (aldol condensation)

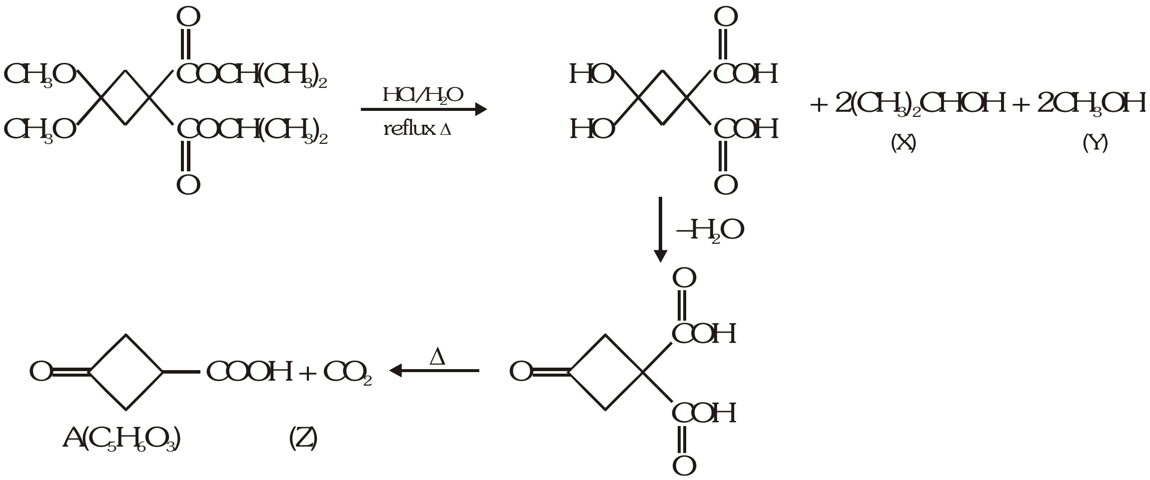
D : 

E : 

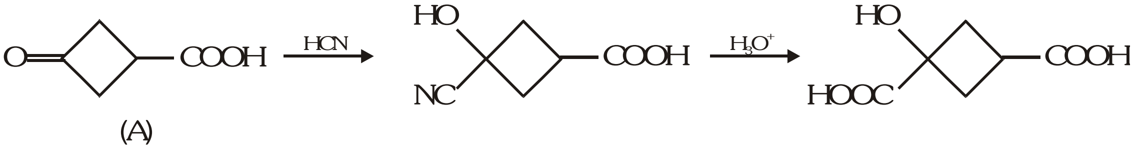
2. Given compound represents

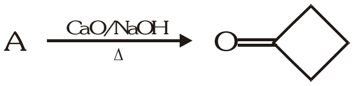
(i) acetal (ii) ester

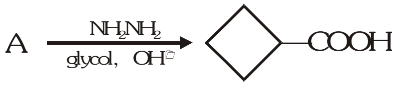
When it is subjected to acidic hydrolysis, acetal changes to carbonyl group and ester changes to acid.

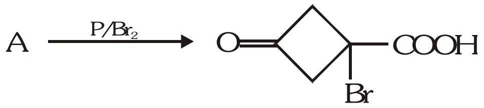


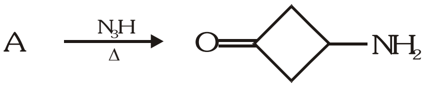
(X), (Y) and (Z) are thus, other carbon containing product along with $C_5H_6O_3$ which is the main product. $A(C_5H_6O_3)$ has (i) keto group (ii) carboxylic group

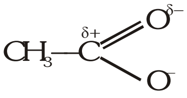
(A) 

(B) 

(C)  (Wolff-Kishner reduction)

(D)  (HVZ-reaction)

(E)  (Schmidt-reaction)

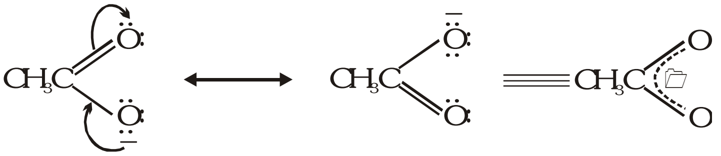
3. 

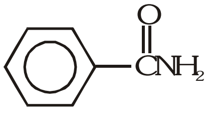
Acetate ion

$CH_3-CH_2-O^-$

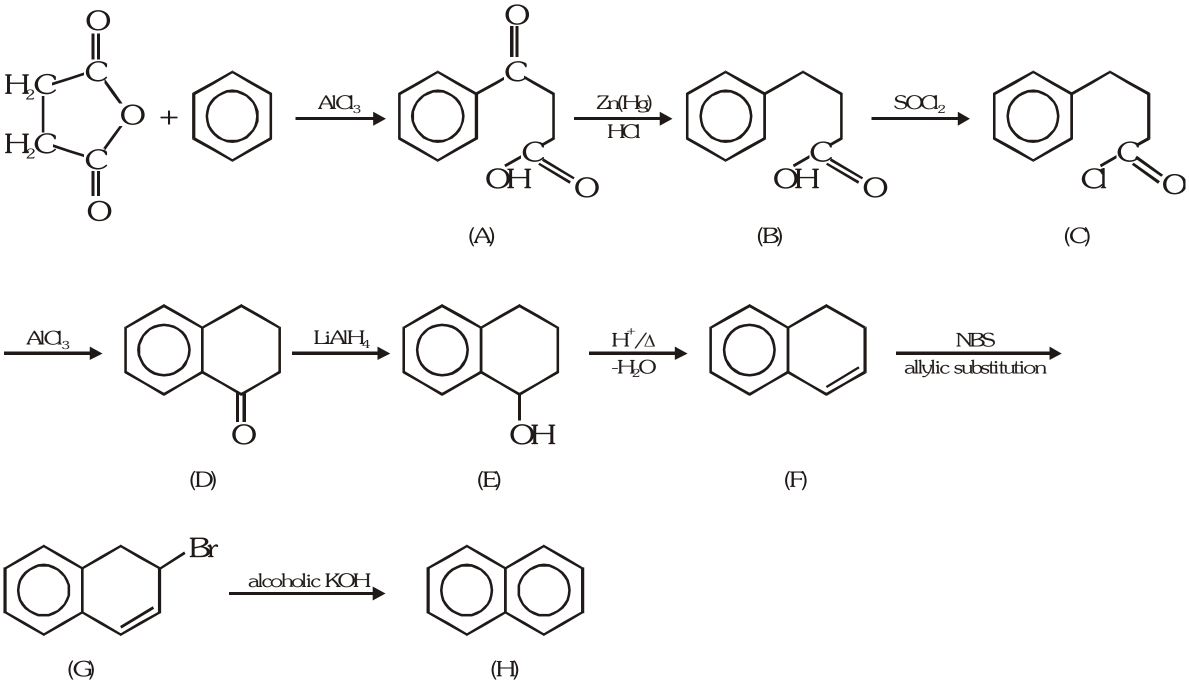
Ethoxide

Electron delocalion, as shown by following resonance structures, causes the negative charge in acetate to be shared equally by both oxygens. This type of resonance effect is not possible in ethoxide ion.

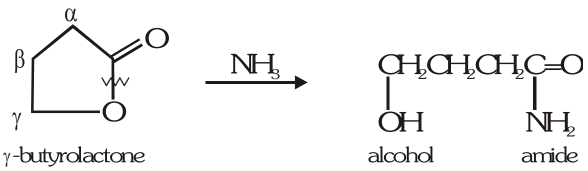


4. (A)  $CH_3\overset{O}{\overset{\|}{C}}Cl$ (B)  (C)  $CH_3\overset{O}{\overset{\|}{C}}O\overset{O}{\overset{\|}{C}}CH_3$

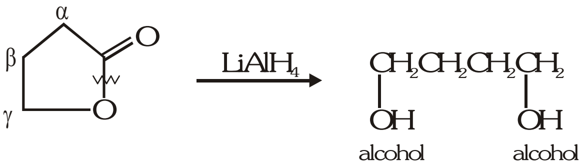
5.



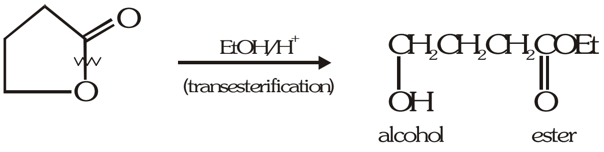
6. (A)



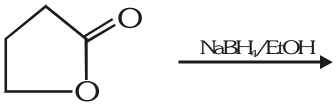
(B)



(C)



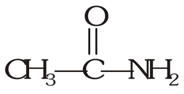
(D)



No reaction (ester is not reduced by $NaBH_4$).

7. In case of carbonyl compounds H^- or R^- are poor leaving group , therefore addition take place. But in case of acid derivatives, Z^- are good leaving group therefore subsitution take palce.

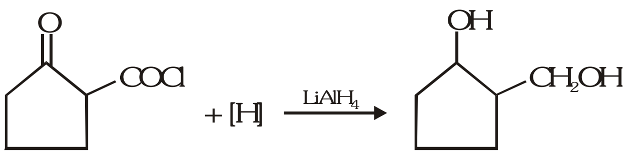
8. (i) A : $CH_3—NH_2$ B :



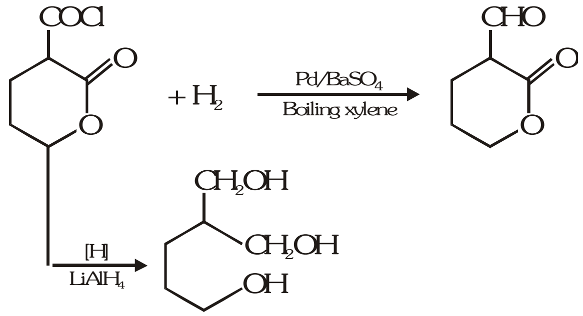
$CH_3—\overset{\overset{O}{||}}{C}—NH_2$

(ii) Reagent $=Br_2$/Alc. KOH

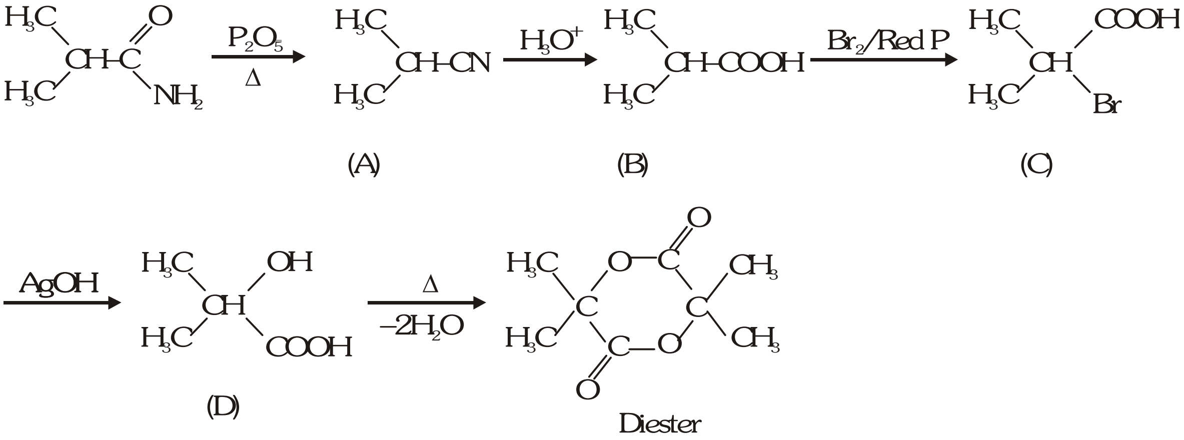
9. (i)



(ii)


COCl
O
O
+ H2
Pd/BaSO4
Boiling xylene
CHO
O
O
[H]
LiAlH4
CH2OH
CH2OH
OH

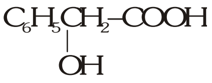
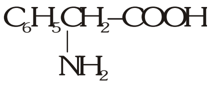
10.


H3C
H3C
CH–C
O
NH2
P2O5
Δ
H3C
H3C
CH–CN
(A)
H3O+
H3C
H3C
CH–COOH
(B)
Br2/Red P
H3C
H3C
CH
COOH
Br
(C)
AgOH
H3C
H3C
CH
OH
COOH
(D)
Δ
–2H2O
H3C
H3C
C
O–C
O
CH3
CH3
C
C–O
O
Diester

EXERCISE–05 PREVIOUS YEARS QUESTIONS

1. The major product of nitration of Benzoic acid is - [IIT-93]
(A) 3–Nitrobenzoic acid (B) 4–Nitrobenzoic acid
(C) 2–Nitrobenzoic acid (D) 2,4–dinitrobenzoic acid

2. The organic product formed in the reaction $C_6H_5COOH \xrightarrow[\text{(ii) } H_2O^+]{\text{(i) } LiAlH_4}$: [IIT-95]
(A) $C_6H_5CH_2OH$ (B) C_6H_5COOH & CH_4
(C) $C_6H_5CH_3$ & CH_3OH (D) $C_6H_5CH_3$ & CH_4

3. Which of the following carboxylic acids undergo decarboxylation easlily [IIT-95]
(A) $C_6H_5CO{-}CH_2COOH$ (B) $C_6H_5COCOOH$
(C) 
$C_6H_5\underset{OH}{\underset{|}{C}}H_2{-}COOH$
(D) 
$C_6H_5\underset{NH_2}{\underset{|}{C}}H_2{-}COOH$

4. The molecular weight of benzoic acid in benzene as determined by depression in freezing point method corresponds to - [IIT-96]
(A) Ionization of benzoic acid (B) Dimerisation of benzoic acid
(C) Trimerisation of benzoic acid (D) Solvation of benzoic acid

5. $CH_3CH_2COOH \xrightarrow[\text{Red P}]{Br_2} X \xrightarrow{NH_3(alc.)} Y$

Y in the above reaction is - [IIT-96]
(A) Lactic acid (B) Ethylamine (C) Propylamine (D) Alanine

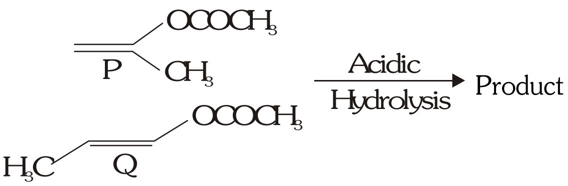
6. Among the given compounds, the most susceptible to nucleophilie attack at the carbonyl group is -[IIT-97]
(A) MeCOCl (B) MeCHO (C) MeCOOMe (D) MeCOOCOMe

7. Read the following statement and explanation and answer as per the option given below : [IIT-98]
Assertion : Acetic acid does not undergo haloform reaction.
Reason : Acetic acid has no alpha hydrogens.
(A) If both assertion and reason are correct, and reason is the correct explanation of the assertion
(B) If both assertion and reason are correct, but reason is not correct explanation of the assertion
(C) If assertion is correct but reason is incorrect
(D) If assertion is incorrect but reason is correct

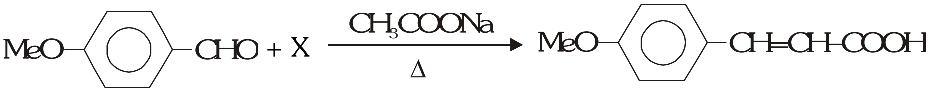
8. When propionic acid is treated with aqueous $NaHCO_3$, CO_2 is liberated. The 'C' of CO_2 comes from -
(A) Methyl group (B) Carboxylic acid group [IIT-99]
(C) Methylene group (D) Bicarbonate

9. Benzoyl chloride is prepared from benzoic acid by - [IIT-2000]
(A) Cl_2, hv (B) SO_2Cl_2 (C) $SOCl_2$ (D) Cl_2 , H_2O

10. Which of the following acids has the smallest dissociation constant - [IIT-02]
(A) $CH_3CHFCOOH$ (B) FCH_2CH_2COOH (C) $BrCH_2CH_2COOH$ (D) $CH_3CHBrCOOH$

11. 

formed by P & Q can be differentiated by : [IIT-03]
(A) 2, 4- DNP (B) Lucas reagent ($ZnCl_2$ & conc. HCl)
(C) $NaHSO_3$ (D) Fehlings solution

12.  [IIT-05]

What is X ?

(A) 
$\underset{\displaystyle CHO}{\underset{|}{CH_2}}COOH$ (B) $BrCH_2–COOH$ (C) $COOH(CH_3CO)_2O$ (D) $(CH_3CO)_2O$

13. Compound (A) $C_5H_8O_2$ liberated CO_2on reaction with sodium bicarbonate. It exists in two forms neither of which is optically active. It yielded compound (B). $C_5H_{10}O_2$ on hydrogenation. Compound (B) can be separated into enantiomorphs. Write structures of (A) and (B). [IIT-87]

14. An organic compound (A) on treatment with acetic acid in presence of sulphuric acid produces an ester (B). (A) on mild oxidation gives (C). (C) with 50% KOH followed by acidification with dilute HCl generates (A) and (D). (D) with PCl_5 followed by reaction with ammonia gives (E). (E) on dehydration produces hydrocyanic acid. Identify (A) to (E) [IIT-87]

15. Compound (A) ($C_6H_{12}O_2$) on reduction with $LiAlH_4$ yielded two compounds (B) and (C). The compound (B) on oxidation gave (D). 2 moles of (D) on treatment with alkali (aqueous) and subsequent heating furnished (E). The later on catalytic hydrogenation gave (C). The compound (D) was oxidized further to give (F) which was found to be monobasic acid (m.wt. 60.0). Deduce structures of (A) to (F). [IIT-90]

16. The sodium salt of a carboxylic acid, (A) was produced by passing a gas (B) into aqueous solution of caustic alkali at an elevated temperature and pressure (A) on heating in presence of sodium hydroxide followed by treatment with sulphuric acid gave a dibasic acid (C). A sample of 0.4g of (C) on combustion gave 0.08g of H_2O and 0.39g of CO_2. The silver salt of the acid, weighing 1.0g, on ignition yielded 0.71 g of Ag as residue. Identify (A), (B) and (C). [IIT-90]

17. Two mole of an ester (A) are condensed in presence of sodium ethoxide to give a β-keto ester (B) and ethanol. On heating in an acidic solution (B) gives ethanol and β- keto acid (C). On decarboxylation (C) gives 3-pentanone. Identify (A), (B) and (C) with proper reasoning and give reactions. [IIT-92]

18. An organic compound A($C_4H_6O_3$) on treatment with ethyl alcohol gives a carboxylic acid B and compound C. Hydrolysis of C under acidic conditions gives B and D. Oxidation of D with $KMnO_4$ also gives B. B on heating with $Ca(OH)_2$ gives E (Molecular formula C_3H_6O) E does not gives Tollen's test and does not reduce Fehling solution but forms 2,4–dinitrophenylhydrazone. Identify A to E. [IIT-92]

19. An acidic compound (A), C_4H_8O loses its optical activity on strong heating yielding (B). $C_4H_6O_2$ which reacts readily with $KMnO_4$. (B) forms a derivative (C) with $SOCl_2$, which on reaction with CH_3NH_2 gives (D). The compound (A) on oxidation with dilute chromic acid gives an unstable compound (E) which decarboxylate readily to give (F), C_3H_6O. The compound (F) gives a hydrocarbon (G) on treatment with amalgamated Zn and HCl. Give structures of (A) to (G) with proper reasoning. [IIT-95]

20. An liquid (X) having molecular formula $C_6H_{12}O_2$ is hydrolysed with water in presence of an acid to give a carboxylic acid (Y) and an alcohol (Z). Oxidation of (Z) with chromic acid gives (Y). What are (X), (Y) and (Z).

[IIT-96]

21. Acetophenone on reaction with hydroxylamine-hydrochloride can produce two isomeric oximes. Write structures of the oximes. [IIT-97]

22. An organic acid (A), $C_5H_{10}O_2$ reacts with Br_2 in the presence of phosphorus to give (B). Compound (B) contains an asymmetric carbon atom and yields (C) on dehydrobromination. Compound (C) does not show geometric isomerism and on decarboxylation gives an alkene (D) which on ozonolysis gives (E) and (F). compound (E) gives a positive schiff's test but (F) does not. Give structures of (A) to (F) with reasons.

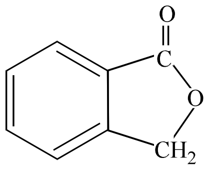
[IIT-97]

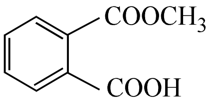
23. The correct IUPAC name of C_6H_5COCl is

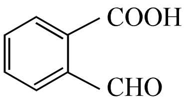
(A) Benzoyl chloride (B) Benzene chloro ketone

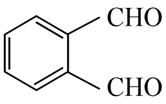
(C) Benzene carbonyl chloride (D) Chloro phenyl ketone [IIT 2006]

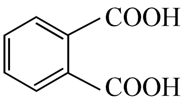
24. Which of the following reactants on reaction with conc. NaOH followed by acidification gives the following lactone as the only product? [IIT 2006]



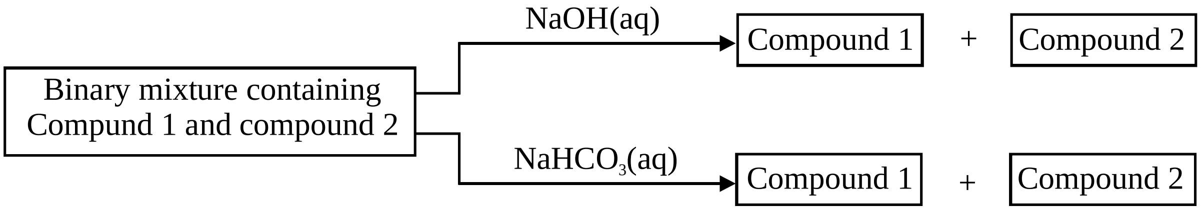
(A) 

(B) 

(C) 

(D) 

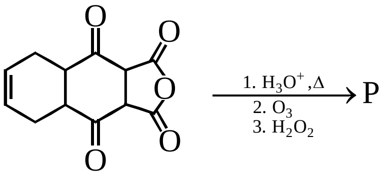
25. Identify the binary mixtures (s) that cna be separated into the individual compounds, by differential extraction, as shown in the given scheme - [IIT 2012]



(A) C_6H_5OH and C_6H_5COOH (B) C_6H_5COOH and $C_6H_5CH_2OH$

(C) $C_6H_5CH_2OH$ and C_6H_5OH (D) $C_6H_5CH_2OH$ and $C_6H_5CH_2COOH$

26. The total number of carboxylic acid groups in the product P is [JEE 2013]



PREVIOUS YEARS QUESTIONS

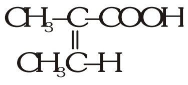
ANSWER KEY

EXERCISE -5

1. (A) 2. (A) 3. (A) 4.(B) 5. (D) 6. (A) 7.(C) 8. (D) 9. (C)

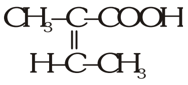
10. (C) 11. (D) 12. (D)

13. (A)



$$\begin{array}{l} CH_3-C-COOH \\ \qquad\;\| \\ \;\;CH_3C-H \end{array}$$

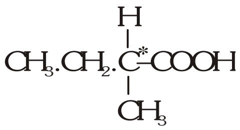
cis



$$\begin{array}{l} CH_3-C-COOH \\ \qquad\;\| \\ \;\;H-C-CH_3 \end{array}$$

trans

(B)



$$CH_3.CH_2.\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C^*}}-COOH$$

(2-methylbutanoic acid)

14. A = CH_3OH (Methanol)

B = CH_3COOCH_3 (Methyl ethanoate)

C = HCHO (Methanal)

D = HCOOH (Methanoic acid)

E = $HCONH_2$ (Formamide or methanamide)

15. (A) $CH_3COOCH_2CH_2CH_2CH_3$

(B) C_2H_5OH

(C) $CH_3CH_2CH_2CH_2OH$

(D) CH_3CHO

(E) $CH_3CH=CHCHO$

(F) CH_3COOH

16. (A) HCOOH ; (B) CO ; (C)

$$\begin{array}{l} COOH \\ | \\ COOH \end{array}$$

17. (A) $CH_3CH_2COOC_2H_5$ (Ethyl propanoate)

(B)

$$CH_3CH_2CO\underset{\underset{\displaystyle CH_3}{|}}{C}HCOOC_2H_5$$

Ethyl - (2-methyl-3-ketopentanoate)

(C)

$$CH_3CH_2CO\underset{\underset{\displaystyle CH_3}{|}}{C}HCOOC_2H_5$$

(2-methyl-3-ketopentanoic acid)

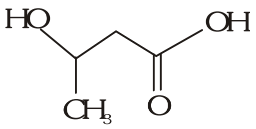
18. (A) $(CH_3CO)_2O$ (Acetic anhydride)

(B) CH_3COOH (Ethanoic acid)

(C) $CH_3COOC_2H_5$ (Ethyl ethanoate)

(D) C_2H_5OH (Ethanol)

(E) CH_3COCH_3

19. A =


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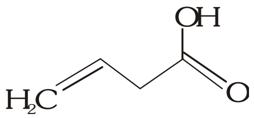
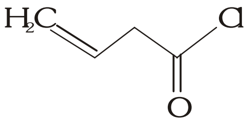
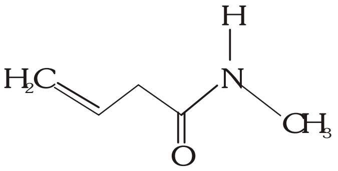
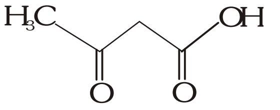


C=


D =


E =


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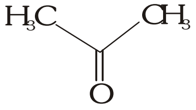
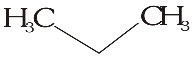
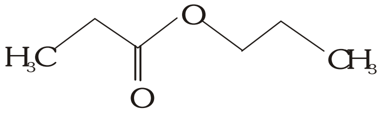
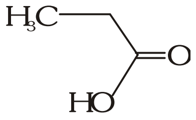


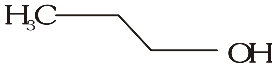
G =


20. X =


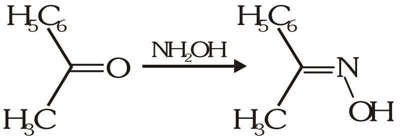
propyl propionate

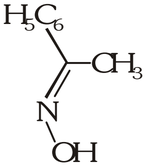
Y =


Propionic acid

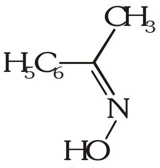
Z =


propan-1-ol

21.


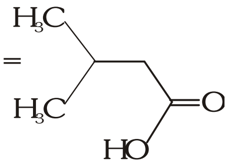


and



syn

anti (isomers)

22. A =


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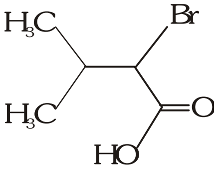
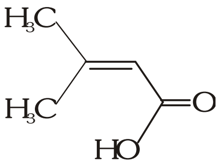


C =


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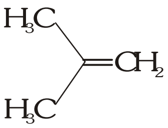
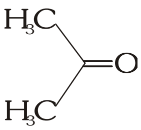


E = HCHO

F =


23. C

24. C

25. B, D

26. (2)

EXERCISE # JEE MAIN
ALL QUESTIONS BASED ON
HALOGEN & OXYGEN CONTAINING ORGANIC COMPOUND

1. Following reaction :

$(CH_3)_3C{-}Br + H_2O \longrightarrow (CH_3)_3C{-}OH + HBr$

is an example of- [AIEEE-2002]

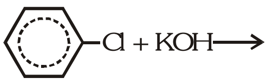
(A) Elimination reaction (B) Free radical substitution

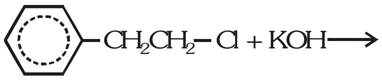
(C) Nucleophilic substitution (D) Electrophilic substitution

2. SN^1 reaction is easible in- [AIEEE-2002]

(A) 

(B) 

(C) 

(D) 

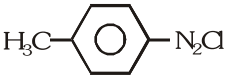
3. Bottles containing C_6H_5I and $C_6H_5{-}CH_2I$ lost their original labels. They were labelled A and B for testing. A and B were separately taken in a test tube and boiled with NaOH solution. The end solution in each tube was made acidic with dilute HNO_3 and then some $AgNO_3$ solution was added. Substance B gave a yellow precipitate. Which one of the following statements is true for this experiment. [AIEEE-2003]

(A) A was C_6H_5I (B) A was $C_6H_5CH_2I$

(C) B was C_6H_5I (D) Addition of HNO_3 was unnecessary

4. The reaction of chloroform with alcoholic KOH and p-toluidine form- [AIEEE-2003]

(A) 

(B) 

(C) 

(D) 

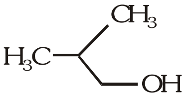
5. The compound formed on heating chlorobenzene with chloral in the presence of concentrated sulphuric acid is- [AIEEE-2004]

(A) Gammaxe (B) DDT

(C) Freon (D) Hexa chloro ethane

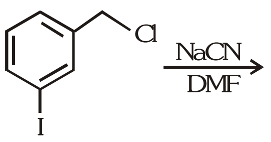
6. Among the following the one that gives positive iodoform test upon reaction with I_2 and NaOH is- [AIEEE-2006]

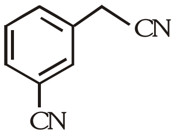
(A) $CH_3CH_2CH(OH)CH_2CH_3$ (B) $C_6H_5CH_2CH_2OH$

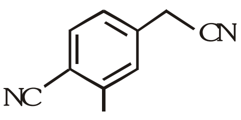
(C) 

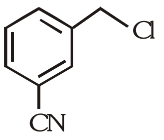
(D) $PhCHOHCH_3$

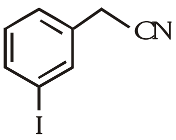
7. The structure of the major product formed in the following reaction is : [AIEEE-2006]



(A) 

(B) 

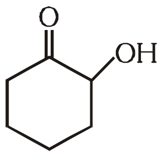
(C) 

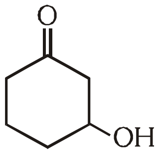
(D) 

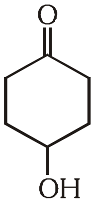
8. Which of the following on heating with aqueous KOH, produces acetaldehyde ? [AIEEE-2009]

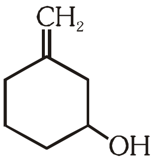
(A) CH_2ClCH_2Cl (B) CH_3CHCl_2 (C) CH_3COCl (D) CH_3CH_2Cl

9. Maximum dehydration takes place that of - [AIEEE-2002]

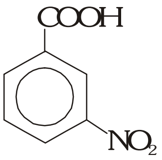
(A) 

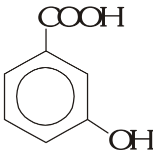
(B) 

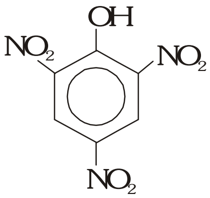
(C) 

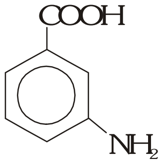
(D) 

10. Picric acid is - [AIEEE-2002]

(A) 

(B) 

(C) 

) 

11. An ether is more volatile than an alcohol having the same molecular formula. This is due to - [AIEEE-2003]

(A) Inter molecular hydrogen bonding in ethers
(B) Inter molecular hydrogen bonding in alcohols
(C) Dipolar character of ethers
(D) Alcohols having resonance structures

12. When $CH_2 = CH–COOH$ is reduced with $LiAlH_4$, the compound obtained will be - [AIEEE-2003]

(A) $CH_3–CH_2–CH_2OH$
(B) $CH_3–CH_2–CHO$
(C) $CH_3–CH_2–COOH$
(D) $CH_2=CH–CH_2OH$

13. The general formula $C_nH_{2n}O_2$ represents [AIEEE-2003]

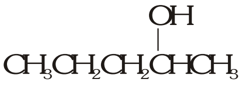
(A) Diols
(B) Dialdehydes
(C) Diketones
(D) Carboxylic acids

14. Which one of the following undergoes reaction with 50% sodium hydroxide solution to give the corresponding alcohol and acid ? [AIEEE-2004]

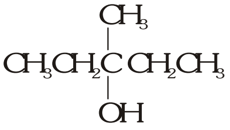
(A) Phenol
(B) Benzaldehyde
(C) Butanal
(D) Benzoic acid

15. Among the following compounds which can be dehydrated very easily is - [AIEEE-2004]

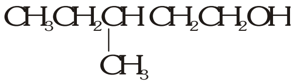
(A) $CH_3CH_2CH_2CH_2CH_2OH$

(B) 

$CH_3CH_2CH_2\overset{OH}{\overset{|}{C}}HCH_3$

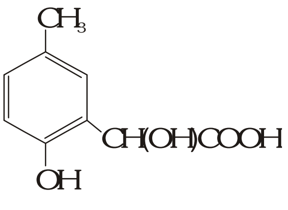
(C) 

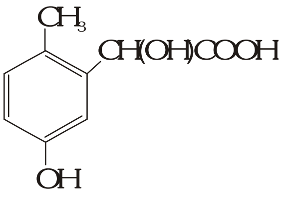
$CH_3CH_2\overset{CH_3}{\overset{|}{\underset{OH}{\underset{|}{C}}}}CH_2CH_3$

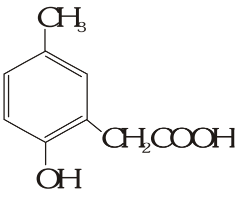
(D) 

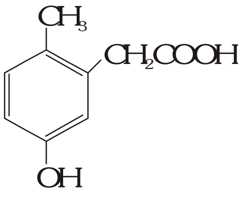
$CH_3CH_2\underset{CH_3}{\underset{|}{C}}H\,CH_2CH_2OH$

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

(A) 

(B) 

(C) 

(D) 

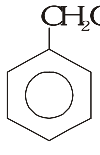
17. HBr reacts with $CH_2 = CH - OCH_3$ under anhydrous conditions at room temperature to give -

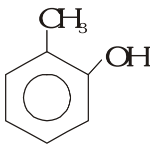
(A) $BrCH_2CHO$ and CH_3OH (B) $BrCH_2-CH_2-OCH_3$ [AIEEE-2006]

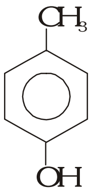
(C) $H_3C-CHBr-OCH_3$ (D) CH_3CHO and CH_3Br

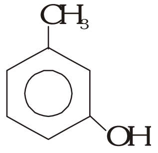
18. The structure of the compound that gives tribromo derivative on treatment with bromine water is -

[AIEEE-2006]

(A) 

(B) 

(C) 

(D) 

19. Phenol, when it first reacts with concentrated sulphuric acid and then with concentrated nitric acid, gives

[AIEEE-2008]

(A) 2, 4, 6– trinitrobenzene (B) α–nitrophenol

(C) p–nitrophenol (D) nitrobenzene

20. Bakelite is obtained from phenol by reacting with

[AIEEE-2008]

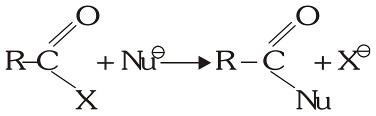
(A) $(CH_2OH)_2$ (B) CH_3CHO (C) CH_3COCH_3 (D) HCHO

21. The best reagent to convert pent–3–en–2–ol into pent –3–en –2–one is - [AIEEE-2005]

(A) Acidic dichromate (B) Acidic permanganate

(C) Pyridinium chloro-chromate (D) Chromic anhydride in glacial acetic acid

22. Rate of the reaction- [AIEEE-2005]



$$R-C(=O)X + Nu^{\ominus} \longrightarrow R-C(=O)Nu + X^{\ominus}$$

is fastest when X is -

(A) NH_2 (B) Cl (C) OCOR (D) OC_2H_5

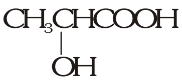
23. In the following sequence of reactions

$CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[Ether]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$, then compound 'D' is - [AIEEE-2007]

(A) butanal (B) n–butyl alcohol (C) n–propyl alcohol (D) propanal

24. End product of the following reaction is - [AIEEE-2002]

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

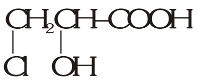
(A) 

$\underset{OH}{CH_3CHCOOH}$

(B) 

$\underset{OH}{CH_2}CH_2COOH$

(C) $CH_2= CHCOOH$

(D) 

$\underset{Cl}{CH_2}\underset{OH}{CH}-COOH$

25. On mixing ethyl acetate with aqueous sodium chloride, the composition of the resultant solution is -

[AIEEE-2004]

(A) $CH_3COOC_2H_5 + NaCl$ (B) $CH_3COONa + C_2H_5OH$

(C) $CH_3COCl + C_2H_5OH + NaOH$ (D) $CH_3Cl + C_2H_5COONa$

26. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is :-

[AIEEE-2009]

(A) Salicylic acid (B) Phthalic acid (C) Benzoic acid (D) Salicyladehyde

27. In Cannizzaro reaction given below :-

$$2PhCHO \xrightarrow{:\overset{\ominus}{O}H} PhCH_2OH + PhCO_2^{\ominus}$$

the slowest step is :- [AIEEE-2009]

(A) The abstraction of proton from the carboxylic group

(B) The deprotonation of $PhCH_2OH$

(C) The attack of $:\overset{\ominus}{O}H$ at the carboxyl group

(D) The transfer of hydride to the carbonyl group

28. A liquid was mixed with ethanol and a drop of concentrated H_2SO_4 was added. A compound with a fruity smell was formed. The liquid was :- [AIEEE-2009]

(A) CH_3COCH_3 (B) CH_3COOH (C) CH_3OH (D) HCHO

29. From amongst the following alcohols the one that would react fastest with conc. HCl and anhydrous $ZnCl_2$, is :- [AIEEE-2010]

(A) 1–Butanol (B) 2–Butanol (C) 2–Methylpropan–2–ol(D) 2–Methylpropanol

30. Sodium ethoxide has reacted with ethanoyl chloride. The compound that is produced in the above reaction is :- [AIEEE-2011]

(A) Ethyl chloride (B) Ethyl ethanoate (C) Diethyl ether (D) 2–Butanone

31. Phenol is heated with a solution of mixture of KBr and $KBrO_3$. The major product obtained in the above reaction is :- [AIEEE-2011]

(A) 4-Bromophenol (B) 2,4,6-Tribromophenol

(C) 2-Bromophenol (D) 3-Bromophenol

32. Trichloroacetaldehyde was subjected to Cannizzaro's reaction by using NaOH. The mixture of the products contains sodium trichloroacetate and another compound. The other compound is :- [AIEEE-2011]

(A) 2,2,2–Trichloropropanol (B) Chloroform

(C) 2,2,2–Trichloroethanol (D) Trichloromethanol

33. Silver Mirror test is given by which one of the following compounds ? [AIEEE-2011]

(A) Formaldehyde (B) Benzophenone (C) Acetaldehyde (D) Acetone

34. Which of the following reagents may be used to distinguish between phenol and benzoic acid? [AIEEE-2011]

(A) Molisch reagent (B) Neutral $FeCl_3$

(C) Aqueous NaOH (D) Tollen's reagent

35. Consider the following reaction :

$C_2H_5OH + H_2SO_4 \rightarrow$ Produce

Among the following, which one cannot be formed as a product under any conditions ? [AIEEE-2011]

(A) Ethyl-hydrogen sulphate (B) Ethylene

(C) Acetylene (D) Diethyl ether

36. Iodoform can be prepared from all except : [AIEEE-2012]

(A) Isobutyl alcohol (B) Ethyl methyl ketone

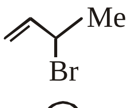
(C) Isopropyl alcohol (D) 3-Methyl–2–butanone

37. Which of the following on heating with aqueous KOH, produces acetaldehyde ? [AIEEE-2009]

(A) CH_2ClCH_2Cl (B) CH_3CHCl_2 (C) CH_3COCl (D) CH_3CH_2Cl

38. Consider the following bromides :- [AIEEE-2010]

Ⓐ



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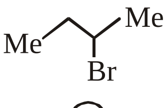


Ⓒ

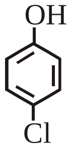
The correct order of $S_N{}^1$ reactivity is

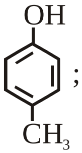
(A) A > B > C (B) B > C > A (C) B > A > C (D) C > B > A

39. A solution of (–) –1–chloro–1–phenylethane in toluene racemises slowly in the presence of a small amount of $SbCl_5$, due to the formation of :- **[JEE-MAIN 2013]**

(A) carbanion (B) Carbene (C) carbocation (D) free radical

40. Arrange the following compounds in order of decreasing acidity :


(I)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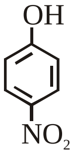
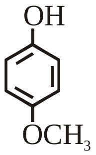
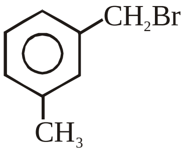
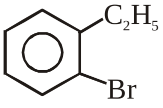

(III)

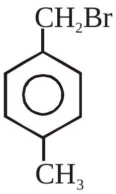

(IV)

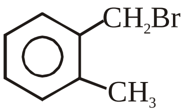
(A) II > IV > I > III (B) I > II > III > IV (C) III > I > II > IV (D) IV > III > I > II

41. 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) :

(A) 

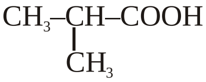
(B) 

(C) 

(D) 

42. An organic compound A upon reacting with NH_3 gives B. On heating, B gives C. C in presence of KOH reacts with Br_2 to give $CH_3CH_2NH_2$. A is :-

(A) CH_3COOH (B) $CH_3CH_2CH_2COOH$

(C) 
$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH$

(D) CH_3CH_2COOH

43. An unknown alcohol is treated with the "Lucas reagent' to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism :-

(A) secondary alcohol by SN1 (B) tertiary alcohol by SN1

(C) secondary alcohol by SN2 (D) tertiary alcohol by SN2

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13
Ans	B	C	B	D	D	B	C	A	B	C	B	D	D
Que.	14	15	16	17	18	19	20	21	22	23	24	25	26
Ans	B	C	A	D	D	Bonus	D	D	B	C	C	B	A
Que.	27	28	29	30	31	32	33	34	35	36	37	38	39
Ans	D	B	C	B	B	C	A,C	B	C	A			
Que.	40	41	42	43									
Ans	C	D	D	B									