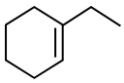
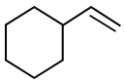
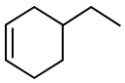
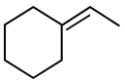
Exercise-1

Marked Questions may have for Revision Questions.

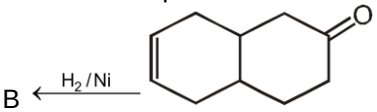
OBJECTIVE QUESTIONS

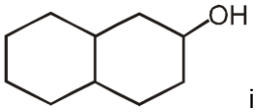
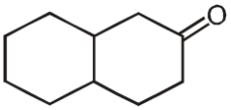
Section (A) : Reduction

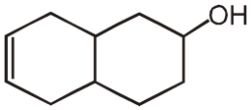
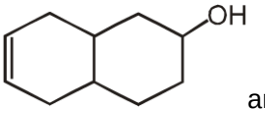
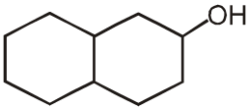
A-1. In which case the reaction is most exothermic with H_2 / Ni ?

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

A-2. What are the products A and B in the following reactions?



(1)  in all cases (2)  in all cases

(3)  in all cases (4*) A =  and B = 

A-3. The reagent used to convert RCOOH $\longrightarrow$ RCH_2OH is

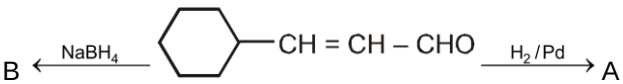
(1) $NaBH_4$ (2) Na/ Alcohol (3) Zn/Hg-HCl (4*) $LiAlH_4$.

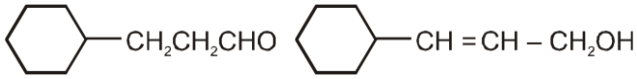
A-4. When benzoic anhydride is treated with $LiAlH_4$, it forms

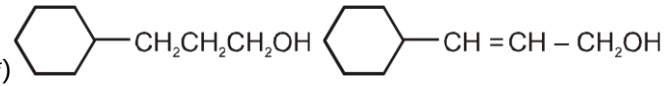
(1) Benzaldehyde (2*) Benzyl alcohol (3) Benzene (4) Toluene

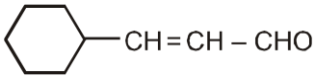
A-5. A $\xrightarrow{LiAlH_4}$ $C_2H_5NH_2$, reactant A is :

(1*) CH_3CN (2) CH_3CH_2CN (3) CH_3NC (4) C_2H_5NC

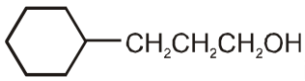
A-6. 

(1) 

(2*) 

(3) 

in both case

(4) 

in both case

A-7. Which of the following reagents can be used to reduce acetone to isopropyl alcohol ?

(1) $LiAlH_4$ (2) $NaBH_4$ (3) H_2/Ni (4*) All the above

A-9._ Aldehyde $\xrightarrow{LiAlH_4}$ product:

(1) 2° Alcohol (2*) 1° Alcohol (3) 3° Alcohol (4) None of these

A-10. Propanoyl chloride is subjected to reduction with H_2 in boiling xylene in the presence of Pd supported over $BaSO_4$. The product formed is
(1) Acetone (2*) Propanal (3) Ethanal (4) Propanol

A-11. In the following reaction $C_2H_5OC_2H_5 + 4H \xrightarrow{RedP+HI} 2X + H_2O$, X is
(1*) Ethane (2) Ethylene (3) Butane (4) Propane

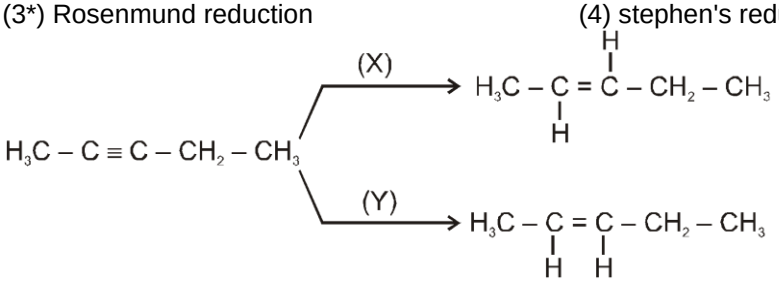
A-12. For the conversion of CH_3OH into methane, the reagent used is :
(1) sodium (2*) P and HI (3) hydrogen (4) $LiAlH_4$

A-13. Stephen reduction converts cyanides into
(1*) Aldehydes (2) Ketones (3) Amines (4) Acids

A-14. The reagent used to convert an alkyne to alkene is :
(1) Zn-Hg/HCl (2*) $Pd/H_2/CaCO_3$ (3) Zn/HCl (4) Sn/HCl

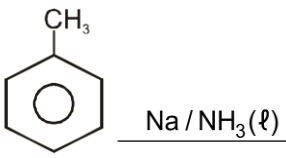
A-15. Hydrogenation in presence of H_2 / Pd / $BaSO_4$ is called
(1) Bouvealt Blanc reduction (2) Birch reduction
(3*) Rosenmund reduction (4) stephen's reduction

A-16.

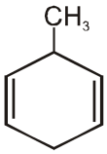
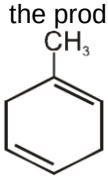
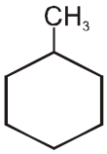
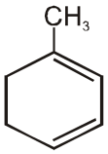


In the above reaction the using reagents X and Y are ;
(1) Na/ liq. NH_3 for X (2) H_2, Pd/ $BaSO_4$ for Y
(3) BH_3-THF + CH_3COOH for Y (4*) All of these

A-17.



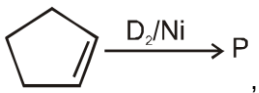
P, the product can be :

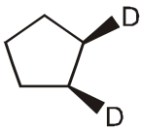
(1)  (2*)  (3)  (4) 

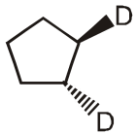
A-18. Ester $\xrightarrow{DiBAL-H/Cold}$ Product.
(1) Alcohol (2*) Aldehyde (3) Ketone (4) Acid

A-19. An isocyanide on reduction with hydrogen in the presence of plantinum gives : **[NSEC-2009]**
(1) amide (2) primary amine (3*) secondary amine (4) alcohol

3. How many alkenes on hydrogenation give 2-methylbutane.
(1) One (2) Two (3*) Three (4) Four

5.  , P is : (P gS)



(1*) (2) 

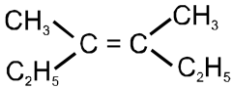
(3) both are correct (4) None

Section (B) :Oxidation

B-1. Baeyer's reagent is;
(1*) alkaline $KMnO_4$ solution (2) acidic $KMnO_4$ solution
(3) neutral $KMnO_4$ solution (4) aqueous bromine solution

B-2. Reactant $\xrightarrow{OsO_4/H_2O_2}$ Diketone, reactant is :
(1*) Alkyne (2) Alkene (3) Alkane (4) Alcohol

B-3. 1-Butyne on reaction with hot alkaline $KMnO_4$ gives:
(1) $CH_3CH_2CH_2COOH$ (2) CH_3CH_2COOH
(3*) $CH_3CH_2COOH + CO_2$ (4) $CH_3CH_2COOH + HCOOH$

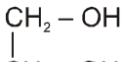
B-4. An alkene with molecular formula C_8H_{16} on oxidation with hot $KMnO_4$ gives acetone and 3-pentanone. The structure of the alkene is
(1*) $(CH_3)_2C=C(C_2H_5)_2$ (2) 
(3) $(C_2H_5)_2C=CHCH_2CH_3$ (4) $(CH_3)_2C=CH(CH_2)_3CH_3$.

B-5. Which of the following decolourises hot $KMnO_4$ solution ?
(1) $CH_3CH_2CH_3$ (2) CH_4 (3) CH_3CH_3 (4*) $(CH_3)_3CH$.

B-6. Jone's reagent is
(1) Acidified $K_2Cr_2O_7$ solution (2) Alkaline $K_2Cr_2O_7$ solution
(3*) CrO_3 in aqueous acetone (4) A solution of $K_2Cr_2O_7/H_2SO_4$ in aqueous ethanol

B-7. Secondary alcohols on heating with reduced copper at 300ºC give
(1) Alkenes (2) Aldehydes (3*) Ketones (4) tert-alcohols

B-8. Which of the following, will be oxidised by HIO_4 ?
(i) R —CO—CO—R (ii) R—CO—CHOH—R
(iii) R—CHOH—CH_2—CHOH—R (iv) R—CHOH—CHOH—R
(1) i, ii and iii (2) i, iii and iv (3*) i, ii and iv (4) ii, iii and iv

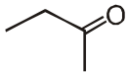
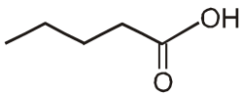
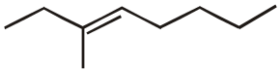
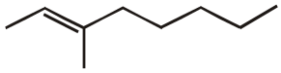
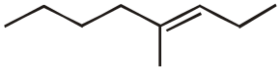
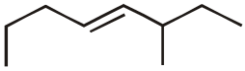
B-9.  $\xrightarrow{HIO_4}$ product obtained in the above reaction
(1*) 2HCHO (2)  (3) 2HCOOH (4) 

B-10. Which of the following do not give glyoxal on ozonolysis followed by reaction with Zn and H_2O ?
(1) Benzene (2) HC ≡ CH (3) Toluene (4*) Ethene

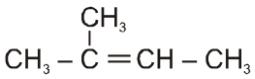
B-11. $CH_3–CH_2–OH \xrightarrow{Reagent} CH_3CHO$, Reagent is :
(1) $KMnO_4$ hot (2) $K_2Cr_2O_7$ (3*) PCC (4) CrO_3/H^+

B-12. X $\xrightarrow[O_3]{Ozonolysis}$ $CH_3CHO + CH_3CH_2CHO$, X is :
(1) 2-butene (2*) 2-pentene (3) 1-pentene (4) Iso-pentene

B-13. The complete combustion of CH_4 gives :
(1) $CO + H_2$ (2) $CO + N_2$ (3) $CO + H_2O$ (4*) $CO_2 + 2H_2O$

11. Alkene (X) $\xrightarrow[\Delta]{KMnO_4}$  + 
X is :
(1*)  (2) 
(3)  (4) 

13. An alkene 'A' contains three C — C, eight C — H σ bonds and one C — C π bond. 'A' on ozonolysis gives two moles of an aldehyde of molar mass 44 u. IUPAC name of compound 'A' is :
(1) But-1-ene (2) Pent-2-ene (3*) But-2-ene (4) Hex-3-ene

20. The compound,  **[AIPMT 2003]**
on reaction with $NaIO_4$ in the presence of $KMnO_4$ gives :
(1) $CH_3COCH_3 + CH_3CHO$ (2) $CH_3CHO + CO_2$
(3) CH_3COCH_3 (4*) $CH_3COCH_3 + CH_3COOH$

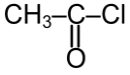
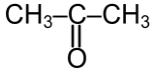
5. Which of the following can not be obtained when alkenes are oxidised with $KMnO_4$ and then followed by acid hydrolysis ? **[NSEC-2000, 01]**
(1) alkanoic acids (2*) alkanals (3) alkanones (4) carbon dioxide

7. Acetone will be obtained on ozonolysis of **[NSEC-2002]**
(1) 1-pentene (2) 2-pentene (3*) isopentene (4) 2-pentyne

13. Oxidation of cyclopentanol to cyclopentanone can be accomplished by using **[NSEC-2005]**
(1) Tollen's reagent (2*) chromic acid (3) bromine water (4) Fehling's solution.

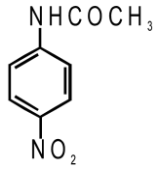
Section (C) :Hydrolysis

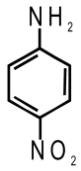
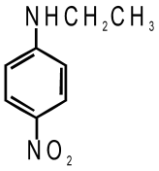
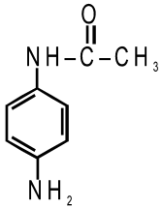
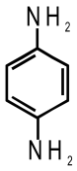
C-1. In which reaction hydrolysis product is acetic acid as the only organic product?
(1) $CH_3–C\equiv N \xrightarrow{H_3O^+}$ (2) $CH_3NC \xrightarrow{H_3O^+}$
(3) $CH_3–CH_2–COCl \xrightarrow{H_3O^+}$ (4) $CH_3–COOC_2H_5 \xrightarrow{H_3O^+}$

C-2_. (X) $\xrightarrow{H_3O^+} CH_3COOH$, X is
(1*)  (2)  (3) CH_3NC (4) $CH_3–CH_2–OCH_3$

C-3_. $CH_3CONH_2 \xrightarrow[\Delta]{H_3O^+}$ Product is
(1) CH_3CH_2OH (2*) CH_3COOH (3) CH_3CHO (4) $CH_3CH_2NH_2$

C-5_. The hydrolysis of acid anhydride produces .....
(1) Two alcohols (2*) Two carboxylic acids
(3) Two aldehydes (4) Two esters

C-6_.  $\xrightarrow{H_3O^+}$ Product is

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

C-7. When water vapours are passed over aluminium carbide, we get:
(1) acetaldehyde (2) ethylene (3*) methane (4) methyl alcohol

C-8. Which of the following compounds on hydrolysis gives propyne ?
(1) CaC_2 (2*) Mg_2C_3 (3) Al_4C_3 (4) Be_2C

C-9. Which of the following compounds on hydrolysis gives acetylene ?
(a) CaC_2 (b) SrC_2 (c) $Al_2(C_2)_3$ (d) MgC_2
(1) a & b only (2) a & c only (3) a & d only (4*) a, b, c & d

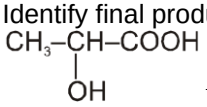
Section (D) : Decarboxylation and heating effects :

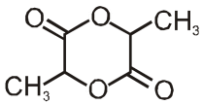
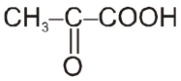
D-1. On heating calcium propionate, the product formed is
(1*) 3-Pentanone (2) 2-Pentanone (3) 3-Methyl-2-butanone (4) Propanone

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

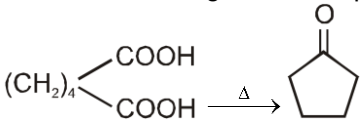
D-3. Acetic acid when heated (300ºC) with MnO gives
(1) formaldehyde (2) acetaldehyde (3*) acetone (4) butaone

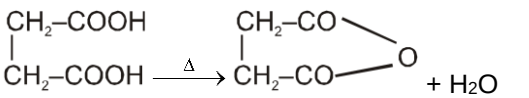
D-4. Identify final product in the following reaction

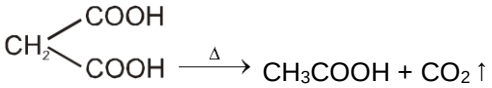
 $\xrightarrow{\Delta}$ product

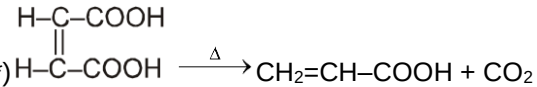
(1*)  (2) CH_2= CH–COOH (3)  (4) CH_3–CH_2–OH

D-5. Which of the following reaction represents **incorrect** product.

(1) 

(2) 

(3) 

(4*) 

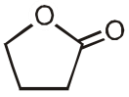
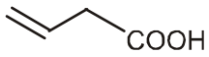
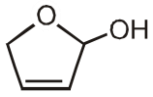
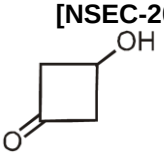
D-6. Action of heat on a mixture of sodium propionate and sodalime produces:
(1) methane (2*) ethane (3) propane ethane (4) ethylene

D-7. An unknown carboxylic acid salt on kolbe's electrolysis form cyclobutane; the carboxylic acid can be:
(1*) adipic acid (2) hexanoic acid (3) succinic acid (4) fumaric acid

D-8. Acetylene may be prepared by electrolysis of
(1) potassium oxalate (2) potassium acetate
(3*) potassium maleate (4) potassium succinate

21._ Which of the following will give cyclopentanone as major product.
(1) Glutaric acid (2) Succinic acid (3*) Adipic acid (4) Malonic acid

17. 4-Oxobutanoic acid is reduced with Na-borohydride and the product is treated with aqueous acid. The final product is : **[NSEC-2009]**

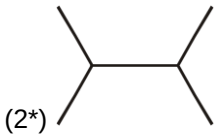
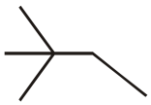
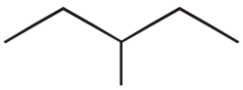
(1*) 
(2) 
(3) 
(4) 

Exercise-2

PART - I : OBJECTIVE QUESTIONS

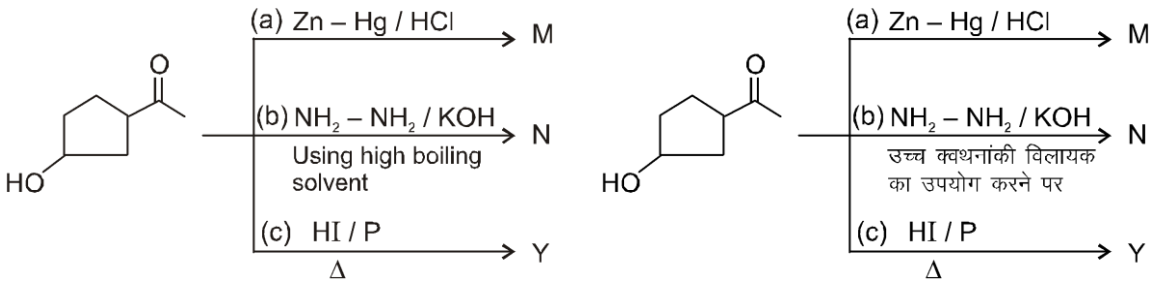
1. The relative rates of catalytic hydrogenation is in the order of -
(1*) $CH_2 = CH_2 > RCH = CH_2 > RCH = CHR > R_2C = CHR$
(2) $R_2C = CHR > RCH = CHR > RCH = CH_2 > CH_2 = CH_2$
(3) $RCH = CHR > R_2C = CHR > RCH = CH_2 > CH_2 = CH_2$
(4) $R_2C = CHR > CH_2 = CH_2 > RCH = CHR > RCH = CH_2$

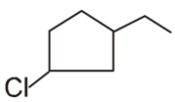
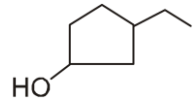
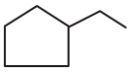
2. C_6H_{12} (A) has two types of alkenes that can be reduced to one type of C_6H_{14} (B). B is:

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

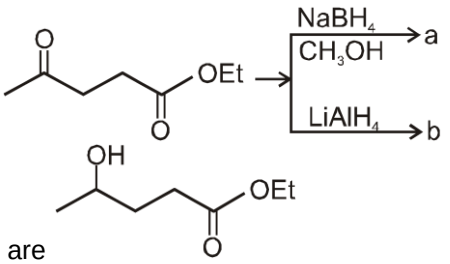
3. Hydrogenation of benzoyl chloride in the presence of Pd / $BaSO_4$ gives
(1) benzyl alcohol (2*) benzaldehyde (3) benzoic acid (4) phenol

4.



(1) M is  (2) N is  (3) Y is  (4*) All of these are correct

6. Identify a & b, in the following reaction :



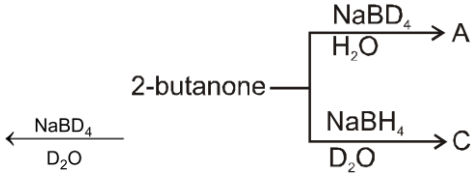
(1) Both are

(2) Both are (+ EtOH)

(3*) a = , b = (+ EtOH)

(4) a = (+ EtOH), b =

7. Consider reduction of 2-butanone.



A, B and C are respectively.

(1) in all cases

(2*) , ,

(3) , ,

(4) in all case

8. Clemmensen reduction is not preferred for compounds which have_____group.

(1) Base sensitive (2*) Acid sensitive (3) both of the above (4) none of these

9. Wolff kishner reduction is not prefer in which of the following?

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

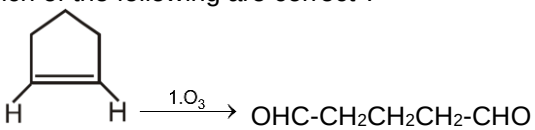
10. Clemensen reduction cannot be used in which of the following ?

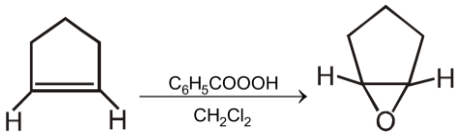
(1) (2*) (3) (4)

12. On oxidation, an unknown alkene C_8H_{16} gives a mixture of propanoic acid and pentanoic acid. The unknown alkene can be

(1*) cis-3-octene (2) trans-2-octene (3) cis-4-octene (4) trans-4-octene

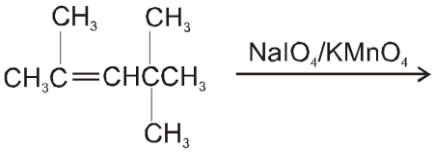
14. Which of the following are correct ?

(1) 

(2) 

(3) 

(4*) All of these

15.  products, products are:

(1*) CH_3COCH_3, $(CH_3)_3CCOOH$ (2) CH_3COCH_3, $(CH_3)_3CCHO$

(3) CH_3COOH, $(CH_3)_3CCOOH$ (4) none is correct

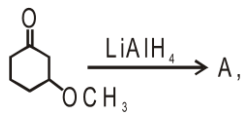
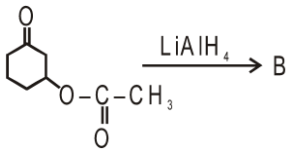
16. Which functional group can not be reduced by H_2/Pd at room temperature?

(1) –C(=O)–Cl (2) –CHO (3) –C(=O)– (4*) –C(=O)–NH_2

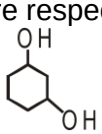
17. In which reaction correct product is given ?

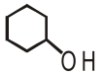
(1) $CH_3–C\equiv N \xrightarrow{DIBAL-H} CH_3–CH_2–NH_2$ (2) $CH_3–CH_2–NO_2 \xrightarrow{LiAlH_4} CH_3–CH_3$

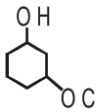
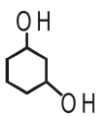
(3*) $Ph–CH=O \xrightarrow[KOH,\ \Delta]{NH_2–NH_2} Ph–CH_3$ (4) $CH_3–C\equiv C–CH_3 \xrightarrow[NH_3,(l)]{Na}$ Cis-but-2-ene

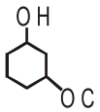
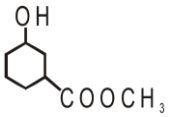
18. (i)  (ii) 

A & B are respectively :

(1) Both 

(2) Both 

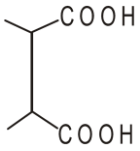
(3*) A is  , B is 

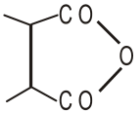
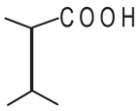
(4) A is  , B is 

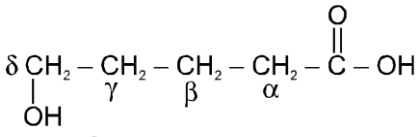
19. In the follwoing reaction reagent Z can be

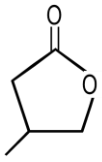
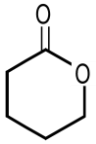
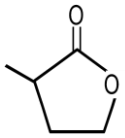
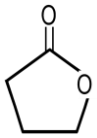
Pent-4-en-2-one $\xrightarrow{\text{Reagent}-Z}$ Pentan-2-ol

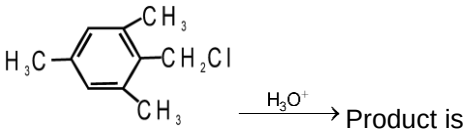
(1) $NaBH_4$, EtOH (2) $LiAlH_4$, ether (bZFkj) (3*) H_2, Pd (4) Na–Hg

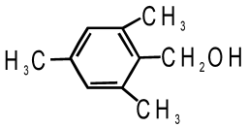
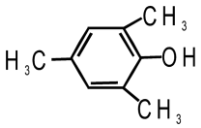
22._  Major product :

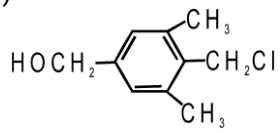
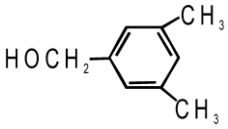
(1*)  (2) $CO + H_2O$ (3)  (4) 

23._  Major product.

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

C-4_.  Product is

(1*)  (2) 

(3)  (4) 

16. Compound X ($C_5H_{10}O$) is a chiral alcohol. It is catalytically hydrogenated to an achiral alcohol Y ($C_5H_{12}O$) and oxidized by activated MnO_2 to an achiral carbonyl compound Z ($C_5H_{10}O$). Compound X is:
[NSEC-2009]

(1*) 1-penten-3-ol (2) 4-penten-2-ol
(3) 3-methyl-2-buten-1-ol (4) 2-methyl-2-buten-1-ol

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 :** Cis-But-2-ene & trans -but-2-ene when reacted with Cold $KMnO_4$ solution gives meso 2,3-dihydroxy butane & (dl) 2, 3-dihydroxy butane respectively .
Reason : Cold $KMnO_4$ solution adds two OH groups at double bond by syn addition.

A-2. **Assertion :** HIO_4 cleaves 1, 2-diols but not 1, 3- or higher diols.

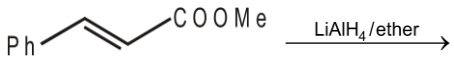
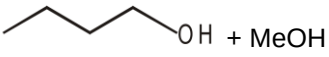
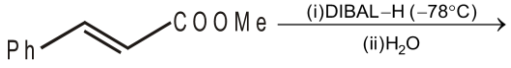
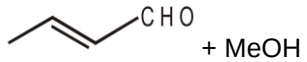
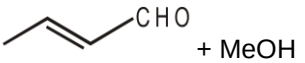
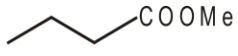
Reason : Only 1, 2-diols form cyclic periodate esters which subsequently undergo cleavage to form carbonyl compounds.

A-3. **Assertion :** Stephens reduction reaction is a characteristic reaction of alkyl cyanides.
Reason : On reaction with lithium aluminium hydride, alkyl cyanides gives primary amines.

A-4. **Assertion :** Acetal or ketal are prepared to protect carbonyl group, from clemmenson's reduction.
Reason : Clemmenson's reduction is method to reduce carbonyl compounds into alkane

Section (B) : MATCH THE COLUMN

B-1.

Column-I **Reactant and reagents**	**Column-II** **Products**
(A) 	(p) 
(B) 	(q) 
(C) 	(r) 
(D) 	(s) 
	(t) No reaction

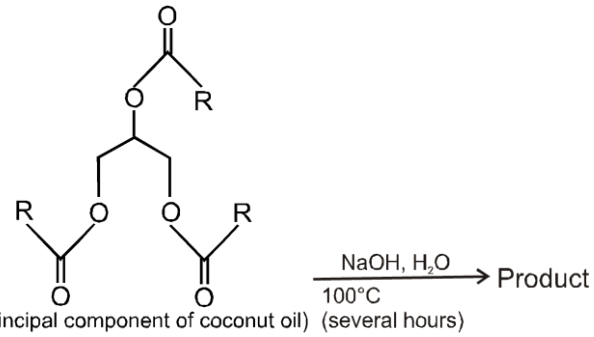
Section (C) : ONE OR MORE THAN ONE OPTIONS CORRECT

C-1. Which of the following catalysts is/are used for partial reduction of alkyne ?

(1*) $Na/NH_3(\ell)$ (2*) Ni_2B or P-2catalyst

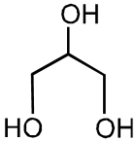
(3*) Lindlar catalyst (4*) Rossenmund catalyst

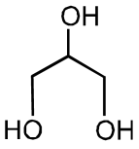
C-2. Propan-1-ol and Propan-2-ol can be best distinguished by :
(1) oxidation with alkaline $KMnO_4$ followed by reaction with H_2O
(2*) oxidation with PCC followed by reaction with Tollen's reagent
(3*) oxidation by heating with copper followed by reaction with idoform test.
(4) reaction with conc.H_2SO_4 followed by reaction with Fehling solution

C-3. 

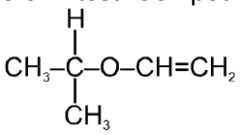
(Principal component of coconut oil) (several hours)

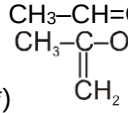
Products obtained in the above reaction is :

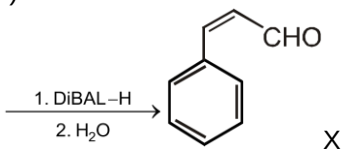
(1*) $R–CO_2Na$ (2*)  (3) RCHO (4) $CH(OH)_3$

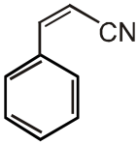
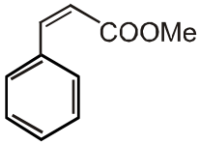
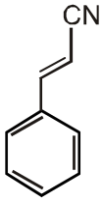
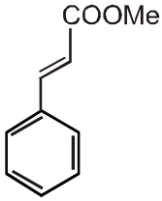
(1*) $R–CO_2Na$ (2*)  (3) RCHOa (4) $CH(OH)_3$

C-4. $C_5H_{10}O \xrightarrow[(A)]{H_3O^{\oplus}} B + C$; (B) and (C) both give +ve iodoform test. Compound (A) is :

(1) $CH_3–CH=CH–O–CH_2–CH_3$ (2*) 

(3*)  (4) None of these

C-5. X  X is

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

Exercise-3

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

1. But-1-ene may be converted to butane by reaction with : **[AIEEE-2003, 3/225]**
(1) Zn–HCl (2) Sn–HCl (3) Zn–Hg (4*) Pd/H_2

2. When $CH_2=CH–COOH$ is reduced with $LiAlH_4$, the compound obtained will be: **[AIEEE-2003, 3/225]**
(1) $CH_3–CH_2–COOH$ (2*) $CH_2=CH–CH_2OH$ (3) $CH_3–CH_2–CH_2OH$ (4) $CH_3–CH_2–CHO$.

3. Which one of the following is reduced with Zn-Hg and HCl to give the corresponding hydrocarbon?
(1) Ethyl acetate (2*) Butan-2-one (3) Acetamide (4) Acetic acid

4. The best reagent to convert pent-3-en-2-ol into pent-3-ene-2-one is **[AIEEE-2005, 3/225]**
(1*) Pyridinium chloro-chromate (2) Chromic anhydride in glacial acetic acid
(3) Acidic dichromate (4) Acidic permanganate

5. The hydrocarbon which can react with sodium in liquid ammonia is: **[AIEEE-2008, 3/105]**
(1*) $CH_3CH_2C\equiv CH$ (2) $CH_3CH=CHCH_3$
(3) $CH_3CH_2C\equiv CCH_2CH_3$ (4) $CH_3CH_2CH_2C\equiv CCH_2CH_2CH_3$

6. In the following sequence of reactions, the alkene affords the compound 'B' **[AIEEE-2008, 3/105]**
$CH_3CH=CHCH_3 \xrightarrow{O_3} A \xrightarrow[Zn]{H_2O} B$, The compound B is :
(1) CH_3COCH_3 (2) $CH_3CH_2COCH_3$ (3*) CH_3CHO (4) CH_3CH_2CHO

7. One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 u. The alkene is : **[AIEEE-2010, 4/144]**

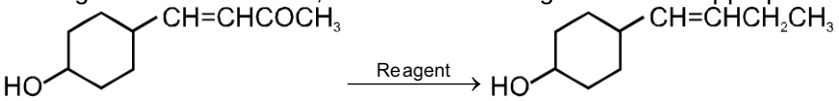
(1) propane (2) 1-butene (3*) 2-butene (4) ethene

$CH_3–CH=CH–CH_3 \xrightarrow{O_3/Zn} CH_3–CH=O$

8. Ozonolysis of an organic compound gives formaldehyde as one of the products. This confirms the presence of :
(1) two ethylenic double bonds (2*) a vinyl group **[AIEEE-2011, 4/120]**
(3) an isopropyl group (4) an acetylenic triple bond

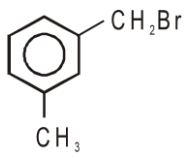
9. 2-Hexyne gives trans-2-Hexene on treatment with : **[AIEEE-2012, 4/120]**
(1) Pt/H_2 (2*) Li / NH_3 (3) $Pd/BaSO_4$ (4) Li AlH_4

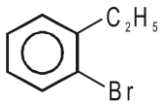
10. In the given transformation, which the following is the most appropriate reagent ? **[AIEEE-2012, 4/120]**

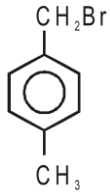


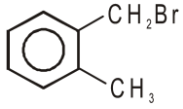
(1*) NH_2NH_2, (2) Zn–Hg/HCl (3) Na, Liq, nzo NH_3 (4) $NaBH_4$

11. 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).

(1) 

(2) 

(3) 

(4*) 

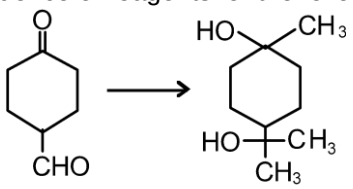
12. The most suitable reagent for the conversion of $R–CH_2–OH \rightarrow R–CHO$ is : **[JEE(Main)-2014, 4/120]**
(1) $KMnO_4$ (2) $K_2Cr_2O_7$
(3) CrO_3 (4*) PCC (Pyridinium Chlorochromate)

13. In the following sequence of reactions :

Toluene $\xrightarrow{KMnO_4}$ A $\xrightarrow{SOCl_2}$ B $\xrightarrow[BaSO_4]{H_2/Pd}$ C

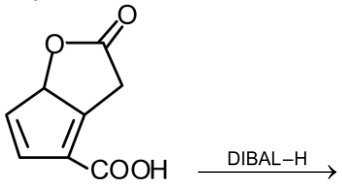
the product C is : **[JEE(Main)-2015, 4/120]**
(1) C_6H_5COOH (2) $C_6H_5CH_3$ (3) $C_6H_5CH_2OH$ (4*) C_6H_5CHO

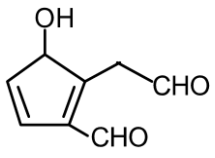
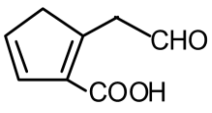
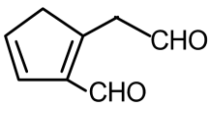
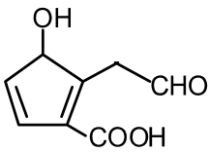
14. The correct sequence of reagents for the following conversion will be : **[JEE(Main)-2017, 4/120]**



(1) CH_3MgBr, H^+/CH_3OH, $[Ag(NH_3)_2]^+OH^-$ (2) CH_3MgBr, $[Ag(NH_3)_2]^+OH^-$, H^+/CH_3OH
(3) $[Ag(NH_3)_2]^+OH^-$, CH_3MgBr, H^+/CH_3OH (4*) $[Ag(NH_3)_2]^+OH^-$, H^+/CH_3OH, CH_3MgBr

15. The major product obtained in the following reaction is : **[JEE(Main)-2017, 4/120]**

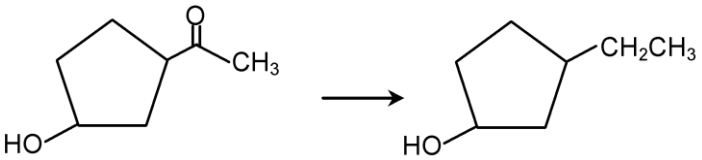


(1)  (2)  (3)  (4*) 

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

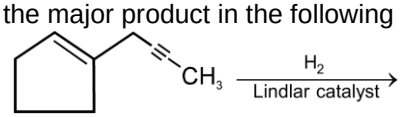
*** Marked Questions may have more than one correct option.**

1. The appropriate reagent for the following transformation : **[JEE-2000(S), 1/35]**

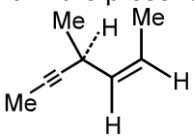


(A) Zn(Hg), HCl (B*) NH_2NH_2, OH^- (C) H_2/Ni (D) $NaBH_4$

2. What would be the major product in the following reaction ? **[IIT-JEE 2000(M), 1/350]**



3. Hydrogenation of the adjoining compound in the presence of poisoned palladium catalyst gives.

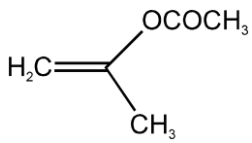
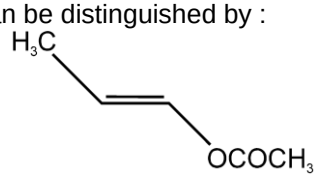


(A) an optically active compound (B*) an optically inactive compound
(C) a racemic mixture (D) a diastereomeric mixture

4. 1-Propanol and 2-Propanol can be best distinguished by : **[IIT-JEE 2001(S), 1/35]**
(A) oxidation with alkaline $KMnO_4$ followed by reaction with Fehling solution
(B) oxidation with acidic dichromate followed by reaction with Fehling solution
(C*) oxidation by heating with copper followed by reaction with Fehling solution
(D) oxidation with concentrated H_2SO_4 followed by reaction with Fehling solution

5. **Assertion :** Dimethylsulphide is commonly used for the reduction of an ozonide of an alkene to get the carbonyl compounds **[IIT-JEE-2001(S), 1/35]**
Reason : It reduces the ozonide giving water soluble dimethyl sulphoxide and excess of it evaporates
(A*) Assertion is True, Reason is True; Reason is a correct explanation for Assertion.
(B) Assertion is True, Reason is True; Reason is NOT a correct explanation for Assertion.
(C) Assertion is True, Reason is False.
(D) Assertion is False, Reason is True.

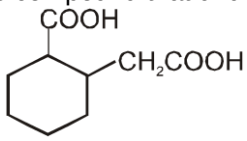
6. The product of acid hydrolysis of P and Q can be distinguished by : **[IIT-JEE 2003(S), 3/84]**

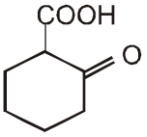
P =  Q = 

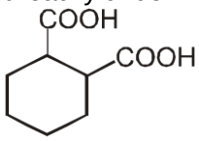
(A) Lucas reagent (B) 2,4–DNP (C*) Fehling's solution (D) $NaHSO_3$

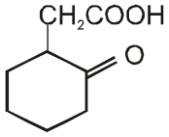
7. Amongst the following the reagent that would convert 2-hexyne into trans-2-hexene is : **[IIT-JEE 2004, 3/84]**
(A) H_2 .Pt / O_2 (B) H_2 .Pd / SO_4^{2-} (C*) Li / NH_3 / C_2H_5OH (D) $NaBH_4$

8. The compound that undergoes decarboxlylation most readily under mild condition is

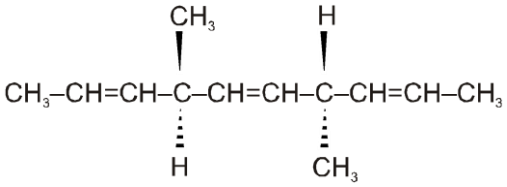
(A) 

(B) 

(C) 

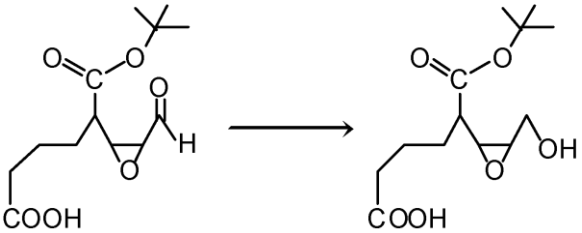
(D) 

9. The number of optically active products obtained from the **complete** ozonolysis of the given compound is:



(1*) 0 (2) 1 (3) 2 (4) 4

10.* Reagent(s) which can be used to bring about the following transformation is(are) : **[JEE(Advance)-2016, 3/124]**



(A) $LiAlH_4$ in $(C_2H_5)_2O$
(B) BH_3 in THF
(C*) $NaBH_4$ in C_2H_5OH
(D*) Raney Ni/H_2 in THF

Additional Problems For Self Practice (APSP)

PART - I : PRACTICE TEST PAPER

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.

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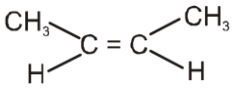
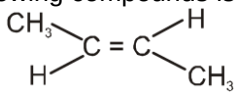
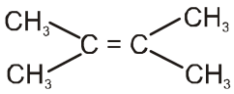
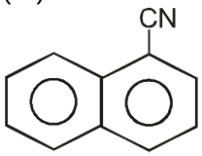
1. Propyne and propene can be distinguished by : **[JEE-2000, 1/35]**

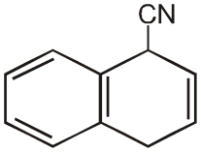
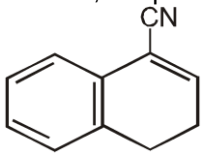
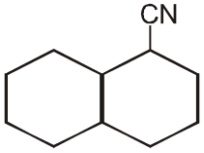
(1) Conc. H_2SO_4 (2) Br_2 in CCl_4 (3) Dil. $KMnO_4$ (4*) $AgNO_3$ in ammonia

2. The reactivity order towards hydrogenation of the following compounds is

(I) $CH_3 - C \equiv C - CH_3$ (II)  (III)  (IV) 

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

3.  $\xrightarrow{Na / NH_3(\ell)}$ P, the product can be :

(1*)  (2)  (3)  (4) None (dksbZ ugha)

4. The product of following reaction is (fuEu vfHkfØ;k dk mRikn gS %)

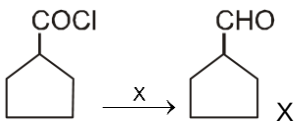
$$PhCH=CHCH=O \xrightarrow[(ii)\ H_3O^{\oplus}]{(i)\ LiAlH_4}$$

(1) $PhCH_2CH=CHCH_2OH$ (2) $Ph(OH)C=CHCH_3$

(3) $PhCH=CHCH_2OH$ (4*) $PhCH_2CH_2CH_2–OH$

5. The product of the reaction $Ph_2C=O \xrightarrow[H_3O^{\oplus}]{LiAlD_4}$ is

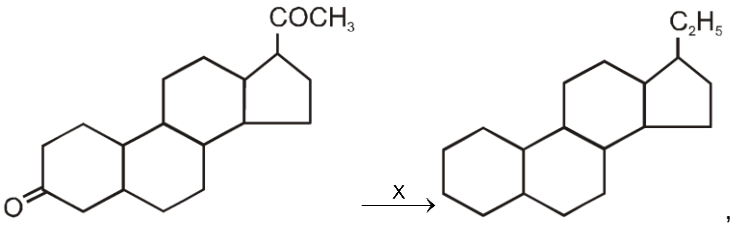
(1*) $Ph_2CD(OH)$ (2) $Ph_2CH(OD)$ (3) $Ph_2CD(OD)$ (4) None (dksbZ ugha)

6.  X can be

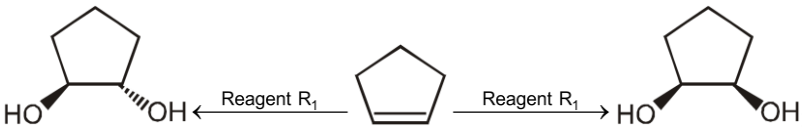
(1) $NaBH_4$/EtOH (2) $LiAlH_4$/THF (3) Na/EtOH (4*) H_2/Pd-$BaSO_4$

7. To reduce a nitroaldehyde to a nitroalcohol the reducing agent of choice is
(1) $LiAlH_4$ (2*) $NaBH_4$ (3) Molecular H_2 (4) $SnCl_2$

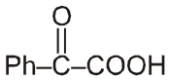
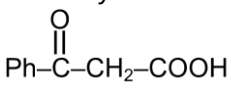
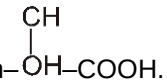
8. Which of the following reagent not convert carbonyl compound into alcohol ?
(1) DiBAL—H (2*) NH_2—NH_2/KOH (3) Na—Hg/HCl (4) $LiAlH_4$

9. 

, X can be
(1) $NH_2 - NH_2$/ KOH (2) Zn – Hg/ HCl (3) Red P + HI (4*) All

10. 

; R_1 and R_2 are
(1) Cold alkaline $KMnO_4$, OsO_4/H_2O_2 (2*) Cold alkaline $KMnO_4$, HCO_3H & H_3O^+
(3) Cold alkaline $KMnO_4$, $C_6H_5CO_3H$ (4) $C_6H_5CO_3H$, HCO_3H

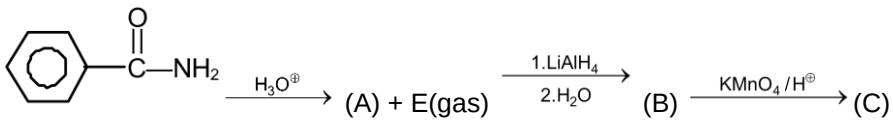
11. Among the following acids which undergoes fastest decarboxylation is
(1) 
(2*) 
(3) PhCOOH
(4) 

12. An alkene on ozonolysis yields only ethanal. There is an isomer of this, which on ozonolysis yields :
(1*) Propanone and methanal (2) Propanone and ethanal
(3) Ethanal and methanal (4) Only propanone

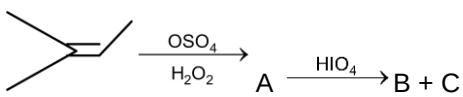
13. Propanoic acid or its sodium salt can be converted into alkanes by reduction with HI/red P or decarboxylation reaction or Kolbe's electrolysis reaction. Which of the following alkanes is not formed in any of these reactions ?
(1*) Methane (2) Ethane (3) Propane (4) Butane

14. Which of the following will decolorise alkaline $KMnO_4$ solution ?
(1) C_3H_8 (2) CH_4 (3) CCl_4 (4*) C_2H_4

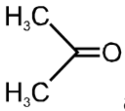
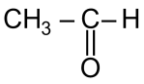
15. If 2-pentanone is reacted with $NaBH_4$ followed by hydrolysis with D_2O the product will be **[NSEC-2000]**
(1*) $CH_3CH(OD)CH_2CH_2CH_3$ (2) $CH_3CD(OH)CH_2CH_2CH_3$
(3) $CH_3CH(OH)CH_2CH_2CH_3$ (4) $CH_3CD(OD)CH_2CH_2CH_3$

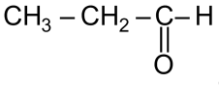
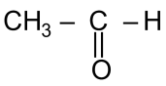
16. 

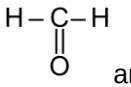
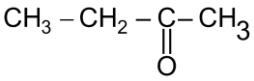
Select correct options, for identical pairs
(1) P, A (2*) A, C (3) B, C (4) P, C

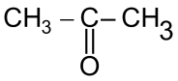
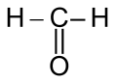
17. 

Products B and C are :

(1*)  and 

(2)  and 

(3)  and 

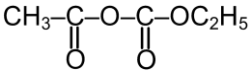
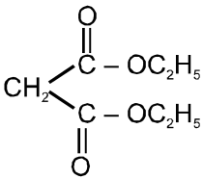
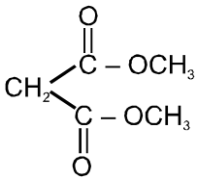
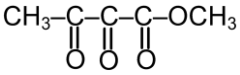
(4)  and 

18. The best reagent to convert pent-3-en-2-ol into pent -3-en- 2-one is
(1) Acidic permanganate (2) Acidic dichromate
(3) Chromic anhydride in glacial acetic acid (4*) Pyridinium chloro-chromate

19. Fenton's reagent is :
(1*) $FeSO_4 + H_2O_2$ (2) $HgSO_4 + H_2O_2$
(3) $FeSO_4 + H_2O$ (4) None of these

20. The reagent with which both acetaldehyde and acetone react easily is
(1) Tollen's reagent (2) Schiff's reagent (3*) Grignard reagent (4) Fehling reagent

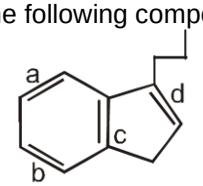
21. An organic compound (P) with molecular formula $C_5H_8O_4$ is stable to heat but hydrolyse to (Q) and MeOH by NaOH followed by acidification. (Q) on strong heating gives (R) which with Red P/HI gives ethane. Compound (P) is :

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

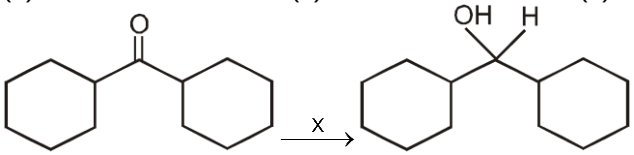
22. When acetaldehyde is treated with Fehling's solution, it gives a precipitate of
(1) Cu (2) CuO (3*) Cu_2O (4) $Cu + Cu_2O + CuO$

23. Identify the correct statement about MnO_2/Δ
(1*) $C_6H_5–CHOH–CH_3$ as well as $CH_3–CH = CH–CH_2OH$ are oxidised by MnO_2.
(2) $C_6H_5–CH_2–CH_2–OH$ as well as $CH_2=CH–CH_2–CH_2–OH$ are oxidized by MnO_2.
(3) $C_6H_5–CHOH–CH_3$ is not oxidised but $CH_3–CH=CH–CH_2–OH$ is oxidized by MnO_2.
(4) $C_6H_5–CHOH–CH_3$ is oxidised but $CH_3–CH=CH–CH_2OH$ is not oxidized by MnO_2.

24. If 1 mole H_2 is reacted with 1 mole of the following compound. **[NSEC-2000]**



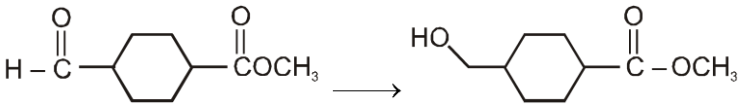
Which double bond will be hydrogenated ?
(1) c (2) b (3) a (4*) d

25. 

X is :

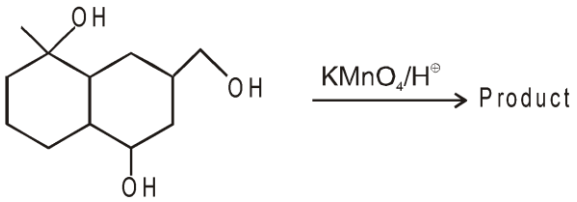
(1) $NaBH_4/EtOH$ (2) $LiAlH_4/THF$ (3) $Al(OiPr)_3 / CH_3–\underset{\displaystyle OH}{\underset{|}{CH}}–CH_3$ (4*) All of these

26. Which reducing agent, would you use to carry out the following transformation.

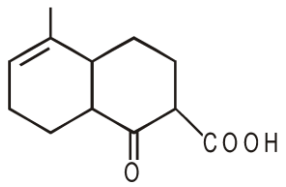


(1) $LiAlH_4$ (2*) $NaBH_4$ (3) Na/NH_3 (4) DIBAL-H

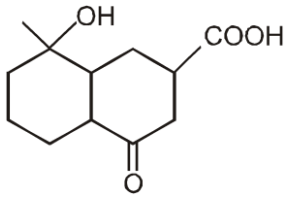
27.



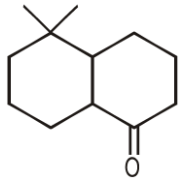
(1)



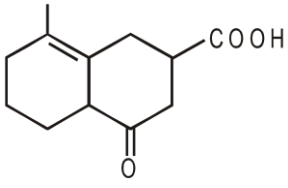
(2*)



(3)

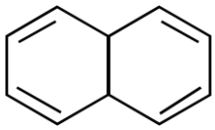


(4)

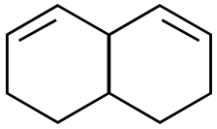


28. An unknown compound decolorizes bromine in carbon tetrachloride, and it undergoes catalytic reduction to give decalin. When treated with warm, conc. potassium permangate, this compound give cis–cyclohexane–1,2–dicaboxylic acid and oxalic acid. Possible a structure for the unknown compound is -

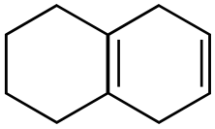
(1)



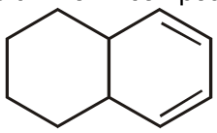
(2)

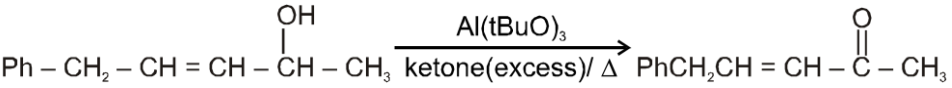


(3)



(4*)



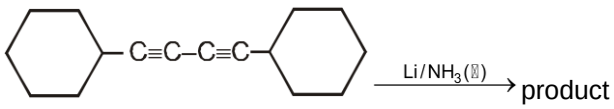
29. The reaction,  is known as :

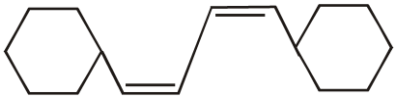
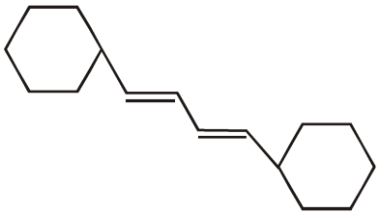
(1) Wolff-kishner reduction (2*) Oppenauer oxidation
(3) Meerwein -Ponndorf reaction (4) Clemmensen reduction

30. A compound is soluble in conc. H_2SO_4. It does not declourise bromine in carbon tetrachloride but oxidised by chromic anhydride in aqueous sulphuric acid within two seconds, turning orange solution to blue, green and then opaque. The original compound is : **[NSEC-2001]**

(1) an alkane (2) a tertiary alcohol (3*) a primary alcohol (4) an ether

PART - II : PRACTICE QUESTIONS

1.  product

(1)  (2*) 

(3) Both (A) and (B) (4) None of these

3. In the reaction **[NSEC-2001]**

$$CH_3CN + 2H \xrightarrow[\text{ether}]{HCl} X \xrightarrow[\Delta]{H_2O} Y,\ Y \text{ is}$$

(1*) acetaldehyde (2) ethanamine (3) dimethylamine (4) acetone

4. If 3-hexanone is reacted with $NaBH_4$ followed by hydrolysis with D_2O, the product will be :

(1*) $CH_3CH_2CH(OD)CH_2CH_2CH_3$ (2) $CH_3CH_2CD(OH)CH_2CH_2CH_3$

(3) $CH_3CH_2CH(OH)CH_2CH_2CH_3$ (4) $CH_3CH_2CD(OD)CH_2CH_2CH_3$

6. The reaction

$$R_2CO + 4[H] \xrightarrow[\text{Conc. HCl}]{Zn-Hg} R_2CH_2 + H_2O$$

is well known as : **[NSEC-2001]**

(1) Wurtz reaction (2) Rosenmund reduction

(3) Kolbe reaction (4*) Clemmensen reduction

8. The reducing agent for conversion of $O_2NCH_2CH_2CH=CH_2$ to $H_2NCH_2CH_2CH=CH_2$ is : **[NSEC-2002]**

(1*) $LiAlH_4$ (2) H_2/Pd (3) B_2H_6 (4) $NaBH_4$

9. Methane may be obtained from monochloromethane by **[NSEC-2002]**

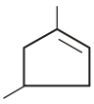
(1*) reduction with nascent hydrogen (Zn + HCl) (2) reduction with hydrogen (H_2)

(3) heating with sodium metal in dry ether (4) hydrolysis with aqueous NaOH.

10. The compound which does not react with lithium aluminium hydride is **[NSEC-2003]**

(1) 3-penten-2-one (2) methyl benzoate (3*) 2-pentanol (4) propanenitrile

11. The compound that would yield a 5-oxo-2-methylhexanal on ozonolysis is **[NSEC-2004]**

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

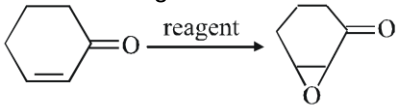
12. Reduction of methylbenzoate ($C_6H_5COOCH_3$) to benzyl alcohol ($C_6H_5CH_2OH$) can be accomplished using

(1) H_2/Pd (2*) $LiAlH_4$ (3) $NaBH_4$ (4) Zn-Hg/HCl

14. Carbonyl compounds can generally be converted to hydrocarbons by **[NSEC-2006]**

(1) H_2/Pt (2) $LiAlH_4$ (3*) N_2H_4-KOH (4) $K_2Cr_2O_7$-H_2SO_4

15. Suggest the suitable reagent for the following transformation. **[NSEC-2008]**



(1) meta-chloroperbenzoic acid (2) ozone

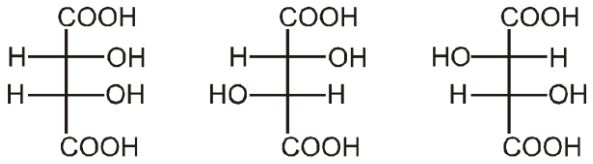
(3) potassium dichromate (4*) alkaline hydrogen peroxide

18. A solution of sodium metal in liquid ammonia is strongly reducing due to the presence of **[NSEC-2013]**

(1) sodium atoms (2) sodium hydride (3) sodium amide (4*) solvated electrons

19. Identify a reagent from the following list which can easily distinguish between 1-butyne and 2-butyne.
(1) bromine, CCl_4 (2) H_2, Lindlar catalyst
(3) dilute H_2SO_4, $HgSO_4$ (4*) ammonical Cu_2Cl_2 solution **[JEE-2002, 3/90]**

20. **P** and **Q** are isomers of dicarboxylic acid $C_4H_4O_4$. Both decolorize Br_2/H_2O. On heating, **P** forms the cyclic anhydride.
Upon treatment with dilute alkaline $KMnO_4$, **P** as well as **Q** could produce one or more than one from **S, T** and **U**. **[JEE Advance- 2013, 3/120]**



S **T** **U**

Compounds formed form **P** and **Q** are, respectively
(1) Optically active **S** and optically active pair **(T, U)**
(2*) Optically inactive **S** and optically inactive pair **(T, U)**
(3) Optically active pair **(T, U)** and optically active **S**
(4) Optically inactive pair **(T, U)** and optically inactive **S**