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JAZI PUBLIC SCHOOL [MATRIC HR. SEC]

Class : 12 Sub: Chemistry - Organic Problems Revision.
Vol II - Unit - 11, 12, 13. PTA - Problems

1. Qn: A Carbonyl compound 'A' having molecular formula $C_5H_{10}O$ forms crystalline precipitate with sodium bisulphite and gives positive iodoform test. 'A' doesnot reduce fehlings solution. Identify 'A'.

Ans: Molecular formula of the compound is $C_5H_{10}O$.

Since the compound does not reduces Fehling solution which means is not an aldehyde, it is a ketone.

Since the compound gives positive iodoform test it must contain α-methyl group. Hence methyl ketone is compound A is 2-pentanone.

$$CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_3$$

2 Qn: A ether (A) $C_5H_{12}O$ when heated with excess of hot concentration HI, produced two alkyl halides, which on hydrolysis forms compound (B) and (C). Oxidation of (B) gives an acid (D) whereas oxidation of (C) gives ketone (E). Identify A, B, C, D & E. Write the chemical equation.

Ans: A ether (A) $C_5H_{12}O$ when heated with excess of hot concentration HI, produced two alkyl halides (B & C)

$$CH_3-CH_2-O-\underset{\text{A}}{\overset{CH_3}{\overset{|}{CH}}-CH_3} \xrightarrow[\text{hot}]{\text{Con. HI}} \underset{\text{B}}{CH_3-CH_2-I} + \underset{\underset{I}{|}}{CH_3-CH-CH_3}$$

Hydrolysis of compound B to give ethanol

$$\underset{\text{B}}{CH_3-CH_2-I} \xrightarrow[\text{aq. KOH}]{\text{hydrolysis}} CH_3-CH_2-OH$$

Hydrolysis compound of C to give 2-propanol

$$CH_3-\underset{\underset{I}{|}}{CH}-CH_3 \xrightarrow[aq.\ KOH]{\text{hydrolysis}} CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$$

Compound 'B' on oxidation to give compound (D) is carboxylic acid

$$CH_3-CH_2-OH \xrightarrow[(O)]{\text{acidified } Na_2Cr_2O_7} CH_3-CHO \xrightarrow[(O)]{\text{acidified } Na_2Cr_2O_7} CH_3-COOH$$

ethanol (B) — ethanal — (D) ethanoic acid

Compound 'C' on oxidation to give compound 'E' is ketone

$$CH_3-\underset{\underset{OH}{|}}{CH}-CH_3 \xrightarrow[(O)]{\text{acidified } Na_2Cr_2O_7} CH_3-\underset{\underset{O}{||}}{C}-CH_3$$

propan-2-ol (C) — (E) propanone

Compound A - 2 ethoxy propane
Compound B - iodoethane
Compound C - 2-iodopropane
Compound D - Acetic acid
Compound E - propanone

Qn:3 An Organic compound (A) on reduction gives compound (B). (B) on treatment with $CHCl_3$ and alcoholic KOH gives (C). (C) on catalytic reduction gives N-methyl amine. Identify A, B, C & write its equation.

Soln:

$$\underset{\text{(A) nitro benzene}}{C_6H_5NO_2} \xrightarrow{\text{reduction}} \underset{\text{(B) Amino benzene}}{C_6H_5NH_2} \xrightarrow[KOH]{CHCl_3/} \underset{\text{(C) cyano benzene}}{C_6H_5CN} \xrightarrow[\text{reduction}]{H_2 \text{ catalyst}} \underset{\text{N-methyl amine}}{C_6H_5NH-CH_3}$$

Q:4 An organic compound C_3H_4 (A) on hydration with Hg^{2+}/H_2SO_4 gives compound (B) which gives positive iodoform test. Compound (B) heated with NH_2-NH_2/C_2H_5ONa to give hydrocarbon (C). (B) also treated with HCHO in the presence of dil. NaOH gives compound D. Identify A, B, C and D. Write the chemical reaction involved.

Ans: An organic compound C_3H_4 (A) is propyne on hydration to give compound (B) is acetone. It undergoes positive iodoform test.

Hydration of alkynes, other than acetylene gives ketones.

Compound (A)

$$CH_3-C\equiv CH + H-OH \xrightarrow[H_2SO_4]{HgSO_4} \left[CH_3-\overset{OH}{\overset{|}{C}}=CH_2\right] \xrightarrow{\text{isomerises}} CH_3-\overset{O}{\overset{\|}{C}}-CH_3$$

prop-1-yne — enol — propanone (Compound B)

Compound (B) heated with NH_2-NH_2/C_2H_5ONa to give hydrocarbon (C).

$$CH_3-\overset{O}{\overset{\|}{C}}-CH_3 + 4(H) \xrightarrow[\text{Con. HCl}]{Zn-Hg} CH_3-CH_2-CH_3 + H_2O$$

Acetone — Compound (C) propane

Compound (B) also treated with HCHO in presence of dil. NaOH gives compound (D)

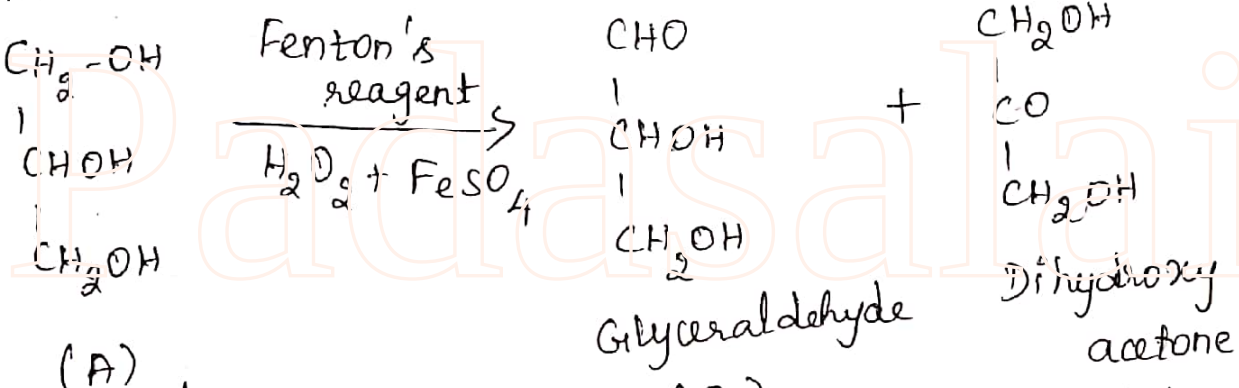
$$HCHO + CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow{\text{dil. NaOH}} HO-CH_2-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$$

formaldehyde — acetone — 4-hydroxy butan-2-one compound (D)

Compound (A)	prop-1-yne	$CH_3 - C \equiv CH$
Compound (B)	propanone	$CH_3 - \overset{\overset{O}{\|}}{C} - CH_3$
Compound (C)	propane	$CH_3 - CH_2 - CH_3$
Compound (D)	4-hydroxy butan-2-one	$HO - CH_2 - CH_2 - \overset{\overset{O}{\|}}{C} - CH_3$

Q.5 An Organic compound (A) – $C_3H_8O_3$ used as a sweetening agent, which on oxidation with Fenton's reagent gives a mixture of compounds B and C. Identify A, B and C. Write suitable reactions.

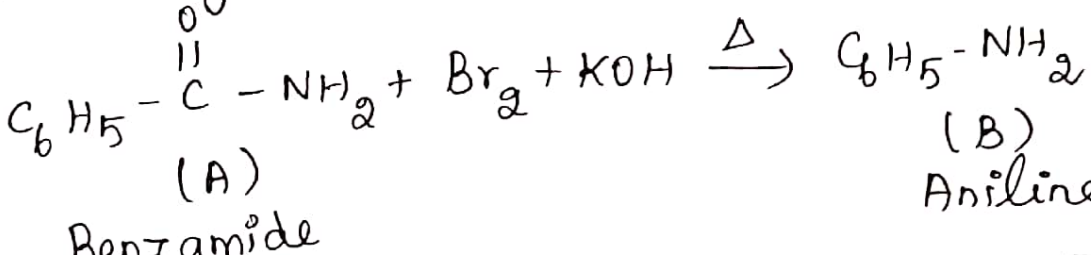
Ans:



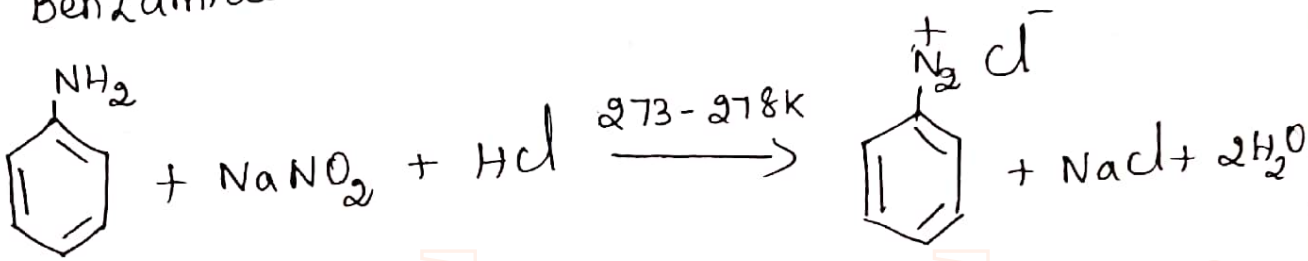
Compound (A)	glycerol	CH_2OH – $CHOH$ – CH_2OH
compound (B)	Glyceraldehyde	CHO – $CHOH$ – CH_2OH
Compound (C)	Dihydroxy acetone	CH_2OH – CO – CH_2OH

glycerase

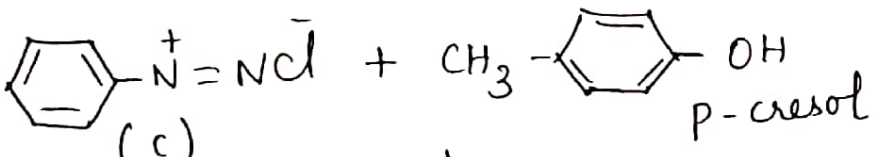
Q:6 An organic compound (A) - C_7H_7NO on treatment with Br_2 & KOH gives an amine (B), which gives carbylamine test. (B) upon diazotization, to give (C). (C) on coupling with p-cresol to give compound (D). Identify A, B, C & D. Write necessary reactions.



(A) Benzamide → (B) Aniline



(B) → (C) Benzenediazonium chloride.

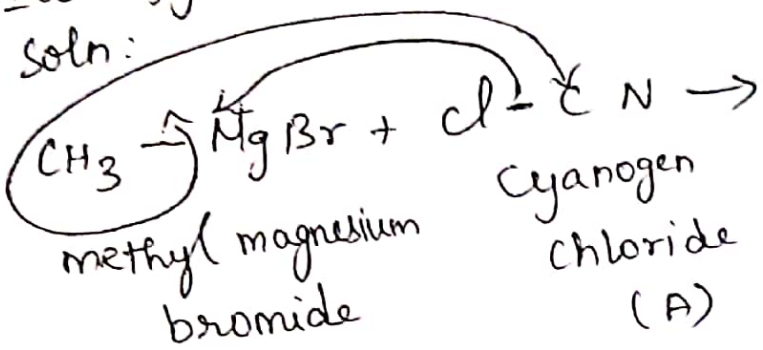


(C) + p-cresol → 2-phenylazo-4-methyl phenol (D)

Compound (A) ⇒ benzamide ; Compound (B) ⇒ Aniline ; Compound (C) ⇒ benzene diazonium chloride ; Compound D = 2-phenyl azo-4-methyl phenol.

Q:7 An Organic compound (A) - CNCl react with methyl magnesium bromide to give compound B. (C_2H_3N). B - upon catalytic reduction to give compound C. (C_2H_7N). C gives carbylamine test. Identify compound A, B and C. Write the reactions.

Soln:



$$CH_3 - CN + 2H_2 \xrightarrow{Ni} CH_3 - CH_2 - NH_2$$

(B) (C)

Ethanamine

Compound (A)	CN - Cl Cyanogen chloride
Compound (B)	$CH_3 - CN$ ethanenitrile
Compound (C)	$CH_3 - CH_2 - NH_2$ ethanamine.

Q:8 An organic compound (A) C_2H_4O reduces Tollen's and fehling's solution. 'A' react with methanol and HCl to give compound B → $C_4H_{10}O_2$. 'A' on reaction with methanal in the presence of dilute NaOH to give compound (C) - $C_3H_6O_2$. Identify compounds A, B and C with necessary reactions.

Compound (A) must be aldehyde because it reduces Tollen's and fehling solution.

$CH_3-CH=O$ (A) acetaldehyde $\xrightarrow[HCl]{2\,CH_3-OH}$ $H_3C-CH(OCH_3)_2$ (B) 1,1-dimethoxy ethane (acetaldehyde dimethylacetal)

methanal represents formaldehyde ($HCHO$)

$HCHO + CH_3CHO \xrightarrow{\text{dil. NaOH}} HO-CH_2-CH_2-CHO$

acetaldehyde (A) → 3-hydroxy propanal (C)

Compound (A)	acetaldehyde	CH_3CHO
Compound (B)	acetaldehyde dimethyl acetal	$H_3C-CH(OCH_3)_2$
Compound (C)	3-hydroxy propanal	$HO-CH_2-CH_2-CHO$

Q:9. An organic compound C_3H_4 (A) on hydration with Hg^{2+}/H_2SO_4 gives compound (B) which gives positive iodoform test. Compound (B) heated with NH_2-NH_2/C_2H_5ONa to give hydrocarbon (C). (B) also treated with HCHO in the presence of dil. NaOH gives compound (D). Identify A, B, C, D Write the chemical reactions involved.

Ans:

$CH_3-C\equiv CH + H-OH \xrightarrow[HgSO_4]{H_2SO_4} [CH_3-C(OH)=CH_2] \xrightarrow{\text{isomerises}}$

(A) prop-1-yne; enol; $CH_3-C(=O)-CH_3$ propanone (B)

$CH_3-\overset{O}{\overset{\|}{C}}-CH_3 + 4[H] \xrightarrow[C_2H_5ONa]{NH_2-NH_2} CH_3-CH_2-CH_3 + H_2O + N_2$

Acetone
propanone
(B)

propane
(C)

$HCHO + CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow{dil.\ NaOH} HO-CH_2-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$

(D)
4-hydroxy butan-2-one

Compound (A)	$CH_3-CH\equiv CH$	prop-1-yne
Compound (B)	$CH_3-\overset{O}{\overset{\|}{C}}-CH_3$	Acetone
Compound (C)	$CH_3-CH_2-CH_3$	propane
Compound (D)	$HO-CH_2-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$	4-hydroxy butan-2-one

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Revision Material

Std : XII Sub : Chemistry Quick Revision Material

2 Marks - PTA

1. CO is a reducing agent. Justify with an example.
2. Transition metals show high melting points. Why?
3. In tetrahedral field, draw the figure to show spiditting of d-orbitals.
4. What is flocculation value?
5. How cathodic protection helps to protect the metal from corrosion?
6. What are antiseptics? Give an example.
7. Write a note on Sabatier - Maithe method.
8. Why formic acid act as strong reducing agent? Give the equation to show its reducing property.
9. The rate constant for a first order reaction is $1.54 \times 10^{-3}\ s^{-1}$. Calculate its half life time.
10. What is water gas equilibrium?
11. Ozone(O_3) act as a powerful oxidising agent. Why?
12. Complete the following reactions.

(i) $2MnO_2 + 4KOH + O_2 \rightarrow$

(ii) $Cr_2O_7^{2-} + 14H^+ + 6I^- \rightarrow$

13. Define ionic product of water.
14. What happens when hydrogen sulphide gas is passed through a solution of arsenic oxide? Name the chemical method.
15. Write a note on denaturation of proteins.

16. How is terylene prepared?

17. Write the IUPAC name of the following:

(i) $C_6H_5-O-CH_2-\underset{|}{CH}-CH_3$ (ii) $CH_2=CH-CH_2-CH_2-OH$

CH_3

(iii) Neopentyl alcohol (iv) Glycerol

18. The equivalent conductance of M/36 solution of a weak monobasic acid is 6 mho cm^2 eq^{-1} and at infinite dilution is 400 mho cm^2 eq^{-1}. Calculate the dissociation constant of this acid.

19. Nitrogen doesnot form any penta halides like phosphorus. why?

20. Why transition elements show variable oxidation state?

21. Give one test to differentiate $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$.

22. What is common ion effect? Give an example.

23. Is it possible to store copper sulphate in an iron vessel for a long time?

Given $E^\circ_{Cu^{2+}/Cu} = 0.34\ V$ and $E^\circ_{Fe^{2+}/Fe} = -0.44\ V$

24. Calculate the half life period of zero order reaction.

25. Give four uses of diethyl ether.

26. Write the zwitter ion structure of alanine.

27. What are food preservatives?

28. How will you convert Boric acid to boron nitride?

29. How are the following conversions effected?
(i) Hex-3-yne → hexan-3-one
(ii) Benzaldehyde → 2-hydroxy phenyl acetic acid
30. Mention the factors that affect the rate of the reaction.
31. What are harmones? Give examples.
32. Describe the underlying principle of froth floatation process.
33. What are active centers?
34. How Nylon-6 is prepared?
35. What is Bragg's equation?
36. Complete the reaction $P_4 + NaOH + H_2O \rightarrow$?
37. $[Fe(CN)_6]^{4-}$ and $[Fe(H_2O)_6]^{2+}$ are of different colours in dilute solutions. why?
38. Which is more basic among $La(OH)_3$ and $Lu(OH)_3$? why?
39. How will you prepare chlorine in the laboratory?
40. What are the characteristics of adsorption?
41. What is Buffer index?
42. Write the structure of α-D(+) glucopyranose
43. Write the chemical equation for oxidation of ethylene glycol with periodic acid.
44. How the tranquilizers work in body?
45. The reaction $(Zn)_{(s)} + Co^{2+} \rightleftharpoons Co_{(s)} + Zn^{2+}$

occurs in a cell. Compute the standard emf of the cell. Given that $E^{\circ}_{Zn/Zn^{2+}} = +0.76\,V$ and $E^{\circ}_{Co/Co^{2+}} = +0.28\,V$

46. What is the role of depressing agent in froath floatation process?

47. Why fluorine is more reactive than other halogens?

48. Define solubility product of a compound.

49. Peptising agent is added to convert precipitate into colloidal solution. Illustrate with an example.

50. A conductivity cell has two platinum electrodes separated by a distance 1.5 cm and the cross sectional area of each electrode is 4.57 cm. Using this cell, the resistance of 0.5N electrolytic solution was measured 15 Ω. Find the specific conductance of the solution.

51. Is it possible to oxidise t-butyl alcohol using acidified dichromate to form a carbonyl compound?

52. How will you prepare Malachite green dye from benzaldehyde?

53. Arrange the following.

(i) In decreasing order of pK_b values:

$C_2H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$, CH_3NH_2.

(ii) Increasing order of basic strength:

$C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$, CH_3NH_2.

54. A hydride of 2nd period alkali metal (X) on reaction with compound of Boron (Y) to give a reducing agent (Z). Identify X, Y and Z.

JAZZ PUBLIC SCHOOL [MATRIC HR SEC]

Class: XII Sub: Chemistry PTA-3 Marks Revision

1. Show that sulphuric acid is a dehydrating agent. Give egs
2. What are interstitial compounds? How they differ from the properties of its pure metals?
3. What is crystal field stabilisation energy?
4. Differentiate crystalline solids & amorphous solids.
5. What is the role of adsorption in heterogeneous catalysis?
6. State & derive Ostwald dilution law.
7. Name the vitamins whose deficiency cause
(i) Pellagra (ii) Beri-Beri
(iii) Night blindness
8. What are bio degradable polymers? Give two examples.
9. Explain the mechanism of cannizaro reaction.
10. Explain the following terms with suitable example
(a) Gangue (b) Slag.
11. Write note on zeolites
12. Mention the uses of Helium and Argon.
13. Calculate the percentage efficiency of packing in BCC
14. What are electro chemical series? How is it useful to predict corrosion?
15. Anisole $\xrightarrow[AlCl_3]{1\text{-butyl chloride}}$ A $\xrightarrow{Cl_2/FeCl_3}$ B $\xrightarrow[\Delta]{HBr}$ C

Complete the above reaction & Find A, B, C..

16. An organic compound (A) on reduction gives compound (B). (B) on treatment with $CHCl_3$ & alcoholic KOH gives (C). (C) on catalytic reduction gives N-methyl aniline. Identify A, B, C and write its equation.
17. (i) How will you prepare benzoic acid from toluene?
(ii) Write two tests to identify carboxylic acid.
18. Derive Arrhenius equation to calculate activation energy from the rate constant k_1 & k_2 at temperature T_1 & T_2 respectively.
19. Write the structure & basicity of following oxy acids
i) hypo phosphoric acid
ii) Ortho phosphoric acid
iii) pyro phosphoric acid

20. What is lanthanide contraction? Mention its consequences.

21. What will be the correct order for the wave length of absorption in the visible region & explain the following $[Ni(H_2O)_6]^{2+}$ $[Ni(H_2O)_6]^{4-}$, $[Ni(NH_3)_6]^{2+}$.

22. What is radius ratio in ionic solid? Tabulate the relation between radius ratio and structural arrangement in ionic solids.

23. Write note on standard hydrogen electrode (SHE)

24. Calculate pH of 10^{-7} M HCl.

25. Write short note on
(i) Benedict's solution test
(ii) Knoevenagel reaction.

26. Account the following:
i) Aniline doesnot undergo Friedel-Crafts reaction.
ii) Ethylamine is soluble in water whereas aniline is not.
iii) Amines are more basic than amides.

27. An organic compound (A) $C_3H_8O_3$ used as a sweetening agent, which on oxidation with Fenton's reagent gives a mixture of compounds B and C. Identify A, B & C. Write possible reactions.

28. Define following terms
(i) Roasting (ii) Calcination.

29. Write a note on Fisher Tropsch synthesis.

30. $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ colourless. Explain.

31. Explain Frenkel defect.

32. What do you mean by Helmholtz electrical double layer?

33. Explain the rate determining step with example

34. How will you prepare 2-methyl hexan-2-ol from grignard reagent?

35. Write note on Etard reaction.

36. An Organic compound (A) $-CN.Cl$ react with methyl magnesium bromide to give compound B - C_2H_3N.
B - upon catalytic reduction to give compound C - C_2H_7N
C gives carbylamine test.
Identify A, B & C and write the reactions.

37. How will you identify borate radical? Write the reactions involved.

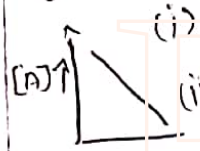
38. Why do transition elements and its compounds acts as catalyst?

39. 0.1M solution of HF is weak acid. But 5M solution of HF is stronger acid.

40. Sketch FCC unit cell & calculate the number of atoms present in it.

41. What are promoters and catalytic poison?

42. For the general reaction, $A \rightarrow B$. Plot of concentration of A Vs time is given in the graph below. Answer the following questions on the basis of this graph?



(i) What is order of reaction?
(ii) What is slope of curve?
(iii) What is unit of rate constant?

43. There are two isomers with formula CH_3NO_2. How will you distinguish between them?

44. What are the tests to differentiate ethanol & phenol.

45. An organic compound C_3H_5Br (A) on treatment with Mg in dry ether gives (B) which on treatment with CO_2 followed by acidification gives (C). Identify A, B, C. Write possible equations.

46. Write short note on Zone refining process.

47. How double salt differs from co-ordination compounds?

48. Calculate the number of unpaired electrons in Ti^{3+}, Mn^{2+} and calculate the spin only magnetic moment.

49. Explain buffer action of acidic buffer.

50. What is zero order reaction? Derive rate law for a zero order reaction?

51. Define the term crystal lattice and unit cell.

52. The major product formed (i) when 1-ethoxy prop-1-ene is heated with one equivalent of HI (ii) what happens when 1-phenyl ethanol is treated with acidified $KMnO_4$?

53. Draw the structures of cellulose and sucrose.

54. Identify compounds A, B, C in the following sequence of reaction.

$$CH_3CH_2NC \xrightarrow{HgO} A \xrightarrow{H_2O} B$$

$$\xrightarrow[HCl]{H_2O/NaNO_2} C$$