XII CBSE - BOARD - MARCH - 2017

CODE (56/ 1) SET - 1

Date: 25.03.2016

CHEMISTRY - SOLUTIONS

1. $P_4 + 20\ HNO_3 \longrightarrow 4H_3PO_4 + 20NO_2 + 4H_2O$

Topic:P-block ;Sub-Topic:Group-15_L-1_XII-CBSE Board Exam-2017_Chemistry.

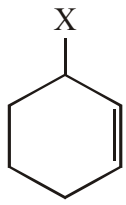
2. $H_3\overset{4}{C} - \overset{3}{C}(CH_3Br) = \overset{2}{C}H - \overset{1}{C}H_2 - OH$

2 - Bromo - 3 - methyl but - 2 - en - 1 - ol

Topic:Alcohol ; Sub-Topic:Nomenclature_L-1_XII-CBSE Board Exam-2017_Chemistry.

3. (a) Catalyst lowers the activation energy barrier.
   (b) No. effect of catalyst on Gibbs energy.

Topic:Chemical Kinetics;Sub-Topic:Collisions Theory_L-1_XII-CBSE Board Exam-2017_Chemistry.

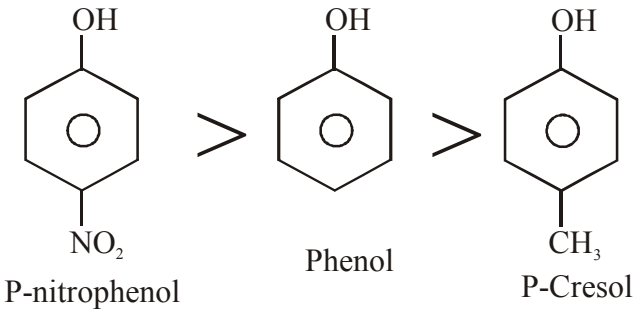
4. 

Topic:H.D.A ; Sub-Topic:Classification_L-1_XII-CBSE Board Exam-2017_Chemistry.

5. The colloid is called Gel.
   Example: cheese, butter, jellies.

Topic:Surface chemistry;Sub-Topic:Colloides classification_L-1_XII-CBSE Board Exam-2017_Chemistry.

6. (a)



P-nitrophenol > Phenol > P-Cresol

(b) $CH_2 = CH_2 + H-\overset{+}{O}\begin{matrix}H\\H\end{matrix} \longrightarrow CH_2 - CH_3 + H_2O$

6. **(OR)**

(a) $CH_3 - \underset{OH}{\underset{|}{CH}} - CH_2 - CH_3 \xrightarrow{CrO_3} CH_3 - \overset{O}{\overset{\|}{C}} - CH_2 - CH_3$

(b) $CH_3 - \underset{OH}{\underset{|}{CH}} - CH_2 - CH_3 \xrightarrow{SOCl_2} CH_3 - \underset{Cl}{\underset{|}{CH}} - CH_2 - CH_3$

Topic:Alcohol,Phenols;Sub-Topic:Reactions_L-2_XII-CBSE Board Exam-2017_Chemistry.

7. In f.c.c. effective number of atom is 4.

Atomic mass of $Al = 27\ g\ mol^{-1}$

$\therefore$ N_A number of Al atom weighs $\rightarrow 27$ gm

$\therefore$ 4 number of Al atom weighs $\rightarrow \frac{27}{N_A} \times 4$ gm

Now :

$\frac{27 \times 4}{N_A}$ gm is contained in $\rightarrow$ 1 unit cell

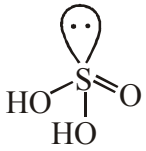
$\therefore$ 1 gm is contained in $\rightarrow \frac{N_A}{27 \times 4}$

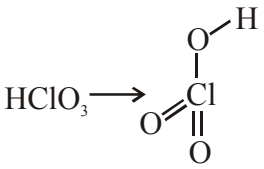
$\therefore$ 8.1 gm is contained in $\rightarrow \frac{N_A \times 8.1}{27 \times 4}$

$$= \frac{6.023 \times 10^{23} \times 8.1}{27 \times 4}$$

$$= 0.4.51 \times 10^{23}$$

Topic:Solid State; Sub-Topic:Unit cell_L-2_XII-CBSE Board Exam-2017_Chemistry.

8. $H_2SO_3 \longrightarrow$ 



Topic:P-block ; Sub-Topic:Group-16,17_L-1_XII-CBSE Board Exam-2017_Chemistry.

9. Mercury cell is suitable for hearing aid devices.

Anode : $Zn(Hg) + 2\bar{O}H \longrightarrow ZnO_{(s)} + H_2O + 2e^-$

Cathod: $HgO + H_2O + 2e^- \longrightarrow Hg_{(l)} + 2\bar{O}H$

Topic:Electrochemistry;Sub-Topic:Cells_L-2_XII-CBSE Board Exam-2017_Chemistry.

10. (a) $Na\left[Au(CN)_2\right]$ (b) $\left[Pt(NH_3)_4\,Cl(NO_2)\right]SO_4$

Topic:Co-ordination; Sub-Topic:IUPAC_L-1_XII-CBSE Board Exam-2017_Chemistry.

11. a) SiC : Covalent network solid
Ar : Non polar molecular solid.

b) ZnO turns yellow on heating because of metal excess defect.

$$ZnO \xrightarrow{\text{heating}} Zn^{+2} + \frac{1}{2}O_2 + 2e$$

Now there is excess of zinc in the crystal and its formula becomes $Zn_{1+x}O$. The excess Zn^{+2} ions more to interstitial site and electrons to neighbouring interstitial site.

c) Group 12 – 16 compound are those where the bonds are not perfectly covalent and the ionic charac ter depends on the electronegativities of the two elements.

Eg: ZnS

Topic:Solid state ; Sub-Topic:Defects_L-2_XII-CBSE Board Exam-2017_Chemistry.

12. (a) $\Delta G^0 = -nFE^0$

here in this reaction $n = 2$

$\Delta G^0 = -2 \times 96500 \times 0.236$

$= -45548\,J$

(b) we know $Q = I \times t$

$\therefore Q = 0.5 \times 2 \times 3600\,C$

$= 3600\,C$

$96500\,C$ charge is contained by $\rightarrow 6.023\times10^{23}$ no.of electrons.

$\therefore\ 3600C$ ..... $\dfrac{6.023\times10^{23}}{96500}\times3600$ no.of electrons.

$= 0.22\times10^{23}$

Topic:Electrochemistry; Sub-Topic:Faraday's law_L-2_XII-CBSE Board Exam-2017_Chemistry.

13. (a) Linkage isomerism.

(b) In $\left[NiCl_4\right]^{2-}$, Ni is sp^3 hybridized due to weak ligand field of Cl^- hence Ni^{+2} has unpaired electrons therefore it is paramagnetic.

Where as $\left[Ni(CN)_4\right]^{-2}$, Ni is dsp^2 hybridized due to strong ligand field of CN^-.Hence in Ni^{+2} ions all electrons are paired. Therefore it is diamagnetic

(c) Because in tetrahedral geometry crystal field splitting energy is very low.

Topic:Co-ordination ; Sub-Topic:C.F.T_L-2_XII-CBSE Board Exam-2017_Chemistry.

14. (a) Multimolecular colloid molecular masses are not very high.

Associated colloid molecular masses are very high.

(b) Peptization is a process of converting a fresh precipitate into colloidal particles by shaking it with disper sion medium in presence of small amount of suitable electrolyte.

Coagulation is process of aggregating together the colloidal particles so as to change them into large sized particles which ultimately settle as a precipitate.

(c) In homogenous catalyst the catalyst and the reactants are present in the same phase in heterogenous catalysis and the reactant are not in the same phase.

14. **(OR)**

a) Disperse phase – oil
Dispersion medium – water

b) chemisorption of physisorption both increases with increase in surface area of the adsorbent.

c) $FeCl_3 + 3H_2O \longrightarrow \underset{(\text{colloidal sol})}{Fe(OH)_3} + 3HCl$

Topic:Surface chemistry;Sub-Topic:Physical properites_L-2_XII-CBSE Board Exam-2017_Chemistry.

15. $K = \dfrac{2.303}{20}\log\dfrac{100}{75}$

$= \dfrac{2.303}{20}\times(\log 4 - \log 3)$

$= \dfrac{2.303}{20}\times(0.6021 - 0.4771)$

$$= \frac{2.303}{20} \times 0.125$$

$$K = 0.014\,\text{min}^{-1}$$

$$K = \frac{2.303}{t} \times \log \frac{100}{25}$$

$$0.014 = \frac{2.303}{t} \log 4$$

$$t = \frac{2.303}{0.014} \times 0.6021$$

$$\boxed{t = 99.05\,\text{min}}$$

Topic:Chemical kinetics ; Sub-Topic:First order reaction_L2_XII-CBSE Board Exam-2017_Chemistry.

16. (a) 1 – Bromopentane

(b) 2 – Bromopentane

(c) 2 – Bromo – 2 – methyl butane

Topic:H.D.A; Sub-Topic:General properties_L-2_XII-CBSE Board Exam-2017_Chemistry.

17. (a) **Zone refining:** The method is based upon the principle that the impurities are more soluble in the molten state than in the solid state of the metal.

(b) **Froth floatation process:** This method is based upon the fact that the surface of sulfide ores is preferntially wetted by oils while that of gangue is preferntially wetted by water.

(c) Chromatography: This method is based upon the principle that the different components of the mixture are adsorbed to different extents on an adsorbent.

Topic:Metallurgy ; Sub-Topic:Concentration & refining_L-1_XII-CBSE Board Exam-2017_Chemistry.

18. a)

$$CH_3COOH \xrightarrow{NH_3/\Delta} \underset{\text{Ethanamide}}{CH_3-\overset{O}{\overset{\|}{C}}-NH_2} \xrightarrow{Br_2/KOH} CH_3-NH_2 \xrightarrow{CHCl_3/KOH} \underset{\text{Methyl isocyanids}}{CH_3-N\equiv C}$$

b)

$$C_6H_5N_2^{\oplus}BF_4^{\ominus} \xrightarrow{NaNO_2/Cu} \underset{\text{Nitro benzene}}{C_6H_5-NO_2} \xrightarrow{Fe/HCl} \underset{\text{Aniline}}{C_6H_5-NH_2}$$

$$C_6H_5-NH_2 \xrightarrow[\text{Pyridine}]{CH_3-\overset{O}{\overset{\|}{C}}-Cl} \underset{\text{N-Phenyl ethanamide}}{C_6H_5-NH-\overset{O}{\overset{\|}{C}}-CH_3}$$

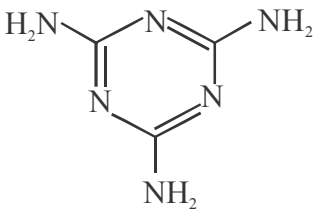
Topic:Carboxylic acid & amines; Sub-Topic:Chemical reaction_L-2_XII-CBSE Board Exam-2017_Chemistry.

19. (a) $HOOC-(CH_2)_4-COOH$ + $H_2N(CH_2)_6NH_2$

Adipic acid Hexamethylene diamine

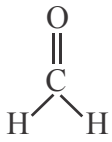
(b) Melamine - formaldehyde polymer.

monomer :



Melamine

+

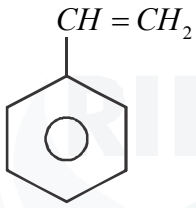


formaldehyde

(c) Buna - s

$CH_2=CH-CH=CH_2$ +

1,3 - Butadiene



Styrene

Topic:Polymer; Sub-Topic:Preparation_ L-1_XII-CBSE Board Exam-2017_Chemistry.

20. a) These are so called because a large part of their molecules are anion and itis the anionic part of the molecule which is involved in their cleansing action.

Eg: sodium lauryl sulphate

$C_{11}H_{23}CH_2OSO_3^-Na^+$

b) The anitibiotics which effect either gram positive or gram negative bacteria is called limited spectrum antibiotics.

Eg: Pencillin.

c) The chemical substances which prevent the growth of micro organism and may even kill them is called aniseptic

Eg: Soframycin

Topic:Chemistry in every day life; Sub-Topic:Detergent_L-1_XII-CBSE Board Exam-2017_Chemistry.

21. (a) Both red phosphorus and white phosphorus consist of P_4 tetrahedral. In white phosphorus, the various P_4 molecules are held together by weak Vander Waal's forces of attraction. In red phosphorus, there P_4 tetrahedral are joined together through covalent bonds, to give polymeric structure. Since it is diffi cult to break strong covalent bonds as compared to weak Vander Waal's forces of attraction therefore, white phophorus is more reactive then red phophorus.

(b) Halogen have one electron less than the nearest noble gas configuration. Therefore they have strong tendency to accept an additional electron and hence halogen have large negative electron gain enthalpies.

(c) $N_2O_5 + H_2O \rightarrow 2HNO_3$

$N_2O_3 + H_2O \rightarrow 2HNO_2$

aqueous solution of N_2O_5 gives nitric acid and

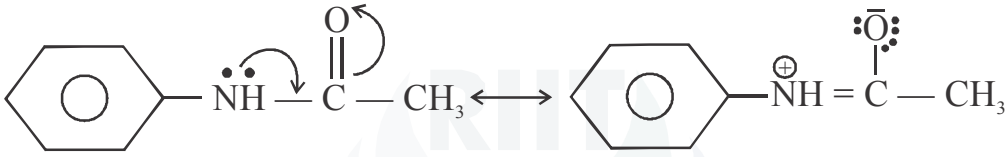
aqueous solution of N_2O_3 gives nitrous acid and

Nitric acid is more acidic than nitrous acid

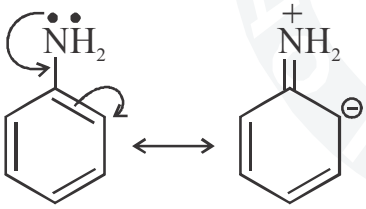
Hence N_2O_5 is more acidic than N_2O_3

Topic:P-block; Sub-Topic:Group-15-17_L-2_XII-CBSE Board Exam-2017_Chemistry.

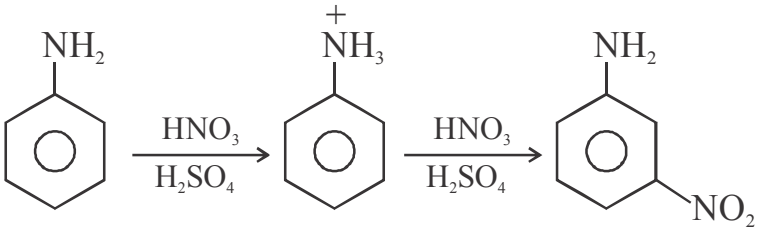
22. (a) The acetyl group being electron with drawing attract the lone pair of electrons on the N-atom towards itself. As a result, lone pair of electrons is not exclusively available for donation to the benzene hence activating effect of the amino group is reduced.



(b) CH_3NH_2 is more basic than $C_6H_5NH_2$ because CH_3–group in CH_3NH_2 has +I effect hence it increases electron density on N-atom. But in $C_6H_5NH_2$ the lone pair of electron involved in resonance with benzene hence not available for donation.



(c) Due to formation of anilinium ion which is electron with drawing group hence gives m-nitroaniline.



Topic:Amines; Sub-Topic:Basicity_L-2_XII-CBSE Board Exam-2017_Chemistry.

23. (a) (i) Rupali is aware of current scientific invensions.

(ii) Rupali is a well-wisher of her friends.

(b) Starch is commonly present in bread.

(c) The two types of secondary structure of protein is α – helix and β – pleated sheet

(d) Vitamic C and vitamin B_1 are water soluble

Topic:Biomolecules ; Sub-Topic:Value based_L-2_XII-CBSE Board Exam-2017_Chemistry.

24. (a) (i) The transition elements have their valence electrons in two different sets of orbitals i.e. $(n-1)d$ and ns. Since there is very little difference in energies of these orbitals both energy levels can be used in bond formation. Higher oxidation states like +3, +4, +5, +6 corresponds to the use of all 4s and 3d electrons in the transition series of elements.

(ii) Transition elements have low ionization enegies. Hence the electrons present in penultimate d and outermost s orbitals are available for metallic bonding. Thus metallic bonds are strong and they are hard metals. In Zn, Cd and Hg all the $(n-1)$ d and ns orbital is completely occupied, hence due to absence of unpaired electrons they are soft metals.

(iii) The comparatively high value of $E°(Mn^{3+},Mn^{2+})$ is an account high stability of Mn^{2+} ion due to stable d^5 configuration of Mn^{2+} ion.

(b) Difference :

Lanthanoids, do not form oxocations.

Actinoids form oxocations $\left(CO_2^{2+},\ PuO_2^{2+}\right)$

Similarity :

Both lanthanoids and actinoids mainly show oxidation state of +3.

24. **(OR)**

(a)

(i) Cr^{+3} is more stable in aqueous solutions because it form octahedral complex $\left[Cr\left(H_2O\right)_6\right]^{+3}$

Cr^{+3} should be more stable as the 3d electrons will enter the t_2g orbitals. Due to CFSE of half filled t_2g orgibals of Cr^{+3}.

(ii) Mn^{+3} is strong oxidising agent because it will easily accept one electron and convert in to Mn^{+2} because Mn^{+2} has d^5 configuration.

$$Mn^{+3}\left(d^4\right)+1e^- \rightarrow Mn^{+2}\left(d^5\right)$$

more stable

(iii) Ti^{+4} is colour less because no unpair electron present in d – orbital.

$$Ti^{+4}=\left[Ar\right]3d^0 4s^0$$

(b) (i) $2MnO_4^- + 16H^+ + 5S^{2-} \longrightarrow 2Mn^{2+} + 8H_2O + 5S$

(ii) $KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$

Topic: d & f - block ; Sub-Topic:chemical properties_L-2_XII-CBSE Board Exam-2017_Chemistry.

25. (a) $T_f^0 = 273.15\,k$

$T_f = 269.15\,k$

10 % solution of sucrose

$w_{sucrose} = 10\,g$

$w_{H_2O} = 90\,g$

$M.M_{sucrose} = 342\ g\,mole^{-1}$

$\Delta T_{f(sucrose)} = 273.15 - 269.15\,K$

$= 4\ K$

$$\Delta T_{f(sucrose)} = \frac{k_f \times w_{sucrose} \times 1000}{w_{H_2O} \times M.M_{sucrose}}$$

$$4 = \frac{k_f \times 10 \times 1000}{90 \times 342}$$

$$k_f = \frac{4 \times 90 \times 342}{10 \times 1000}$$

$= 12.312\ k\,kg\,mol^{-1}$

$w_{glucose} = 10\,g$

$w_{H_2O} = 90\,g$

$M.M_{glucose} = 180\ g\,mole^{-1}$

$$\Delta T_{f(glucose)} = \frac{12.312 \times 10 \times 1000}{90 \times 180}$$

$= 7.6\ K$

$\Delta T_f = 7.6\ K$

$273.15 - T_f = 7.6$

$T_f = 273.15 - 7.6$

$T_{f(glucose)} = 265.55\ k$

(b) (i) Molality : Molality of a solution is defined as the number of moles of solute dissolved in 1 kg of the solvent.

$$M = \frac{\text{no. of moles of the solute}}{\text{mass of solvent in kg}}$$

(ii) Abnormal Molecular Mass: When molecular mass of substance determined by studying any of colligative properties, comes out to be different thean the theoretically expected value the substance is said to show abnormal molecular mass.

Topic: Solutions ; Sub-Topic:Depresstion of freezing point_L-2_XII-CBSE Board Exam-2017_Chemistry.

25. **(OR)**

(a) $w_{urea} = 30\,g$ $M.M_{urea} = 60\,g\,mole^{-1}$

$w_{H_2O} = 846\ g$ $M.M_{H_2O} = 18\,g\,mol^{-1}$

$p^{o}_{H_2O} = 23.8$ mm of Hg

$n_{urea} = \frac{30}{60} = 0.5$ mole

$n_{H_2O} = \frac{846}{18} = 47$ mole

$\frac{p^{\circ} - p}{p^{\circ}} = \frac{n_{urea}}{n_{urea} + n_{H_2O}}$

$\frac{23.8 - p}{23.8} = \frac{0.5}{47 + 0.5}$

$\frac{23.8 - p}{23.8} = \frac{0.5}{47.5}$

$\frac{23.8 - p}{23.8} = 0.011$

$23.8 - p = 0.011 \times 23.8$

$23.8 - p = 0.2618$

$p = 23.8 - 0.2618$

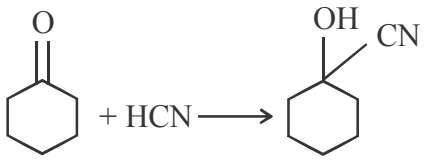
$p = 23.5382$

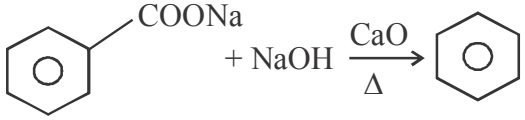
$\boxed{p = 23.54 \text{ mm of Hg}}$

(b)

	Ideal Solution	Non-Ideal Solution
1.	An ideal solution is that solution in which each component obey Raoult's Law.	A solution which does not obey Raoult's Law is called non ideal solution.
2.	$\Delta H_{mix} = 0$ $\Delta V_{mix} = 0$	$\Delta H_{mix} \neq 0$ $\Delta V_{mix} \neq 0$

Topic:Solutions ; Sub-Topic:Vapour pressure_L-2_XII-CBSE Board Exam-2017_Chemistry.

26. (a) (i) 

(ii) 

(iii) $CH_3-CH=CH-CN \xrightarrow[(b)H_2O]{(a)DIBAL-H} CH_3-CH=CH-\overset{\overset{O}{\|}}{C}-H$

(b) (i) with Tollen's reagent Butanal gives silver mirror but Butan – 2 – one does not give.

(ii) Ferric Chloride Test :

Benzoic acid gives Buff coloured ppt with neutral $FeCl_3$

$3CH_3COOH + FeCl_3 \rightarrow (CH_3COO)_3 Fe + 3HCl$

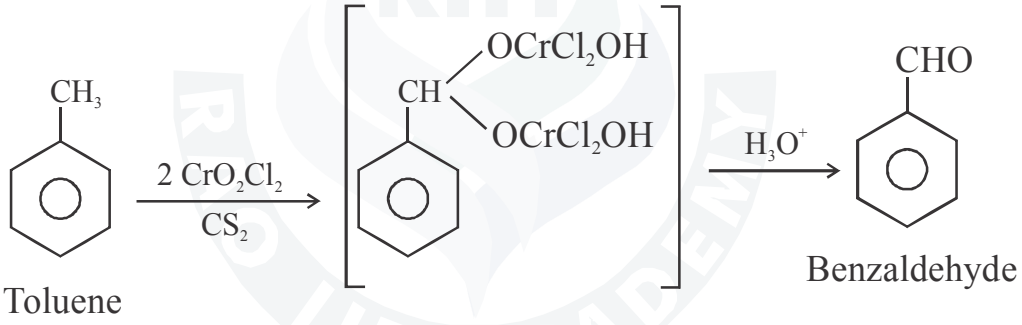
Buff colour ppt

Phenol gives a violet colour when treated with $FeCl_3$ solution.

Topic:Aldehyde & Ketones; Sub-Topic:Distinguish Test_L-2_XII-CBSE Board Exam-2017_Chemistry.

26. **(OR)**

(a) (i) Etard Reaction :



Toluene Benzaldehyde

(ii) Stephen reduction :

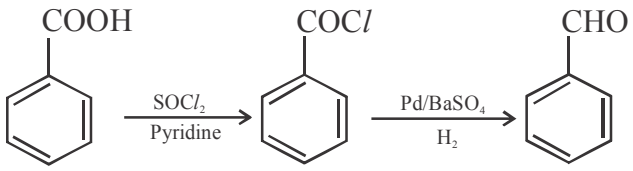
$CH_3-C \equiv N + 2(H) \xrightarrow{SnCl_2/HCl} CH_3CH=NH\cdot HCl \xrightarrow[H_2O]{Boiling}$

Acetonitrile

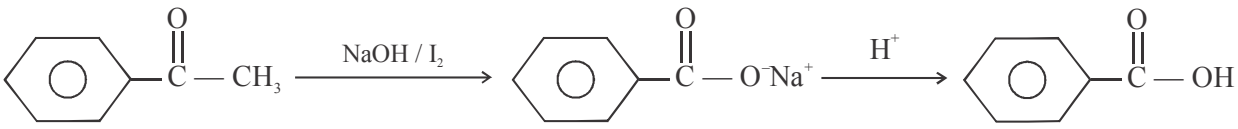
$CH_3-\overset{\overset{O}{\|}}{C}-H + NH_4Cl$

Acetaldehyde

(b) (i) Benzoic acid to Benzaldehyde

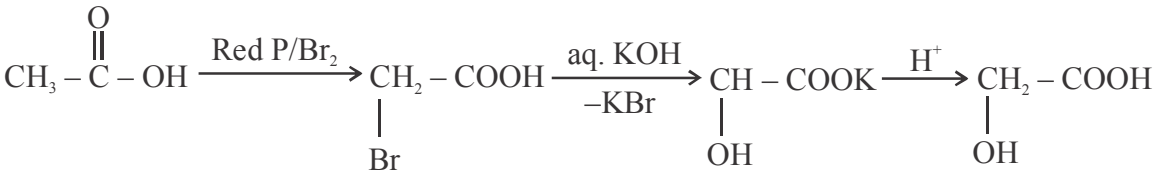


(ii)



Acetophenone Benzoic acid

(iii) Ethanoic acid to 2-hydroxy ethanoic acid



Topic:Aldehyde & Ketones; Sub-Topic:Chemical reaction_L-2_XII-CBSE Board Exam-2017_Chemistry.