

ORGANIC COMPOUNDS TEST

- Test of unsaturation
 - addition of H_2 , $1\pi \equiv 1 \text{ mole } H_2$ (b) addition of $Br_2 \setminus CCl_4$ or Bromine water
*Phenolic compounds gives light yellow ppt with Br_2 water.
*Aromatic amines – gives ppt with Br_2/H_2O
 - Bayer's Reagent – discharge the colour of dil, cold, alkaline $KMnO_4$ to pink or brown.
 - Terminal alkynes gives red/brown ppt with Cu_2Cl_2/NH_4OH – due to Copperalkylide.
 - Terminal alkyne gives white ppt with tollens reagent Silver alkylide.
 - undergoes ozonolysis.
- Test of OH-group
 - evolves H_2 gas with Na metal.
 - gives red soln. with ceric ammonium nitrate.
 - gives ester with acetic anhydrides, acid chloride, acids.
 - gives halides with PCl_5 , PX_3 , anhy. $ZnCl_2$ / conc. HCl or OCl_2 .
 - lucas test (anhy. $ZnCl_2$ / Conc. HCl)
 $3^\circ \rightarrow$ Formation of turbidity \rightarrow immediate
 $2^\circ \rightarrow$ Formation of turbidity within 5 minutes.
 $1^\circ \rightarrow$ No turbidity appears
 - Victor Mayer Test –
 - $P/I_2/\Delta$ (a) Red soln. – nitrolic acid salt $\rightarrow 1^0$
 - $AgNO_2$. Alcohol
 - $NaNO_2$ / conc. H_2SO_4 (b) blue soln. of Pseudonitrol $\rightarrow 2^0$
 - OH^- (c) No colour – 3° alcohol
 - with $Cu/300^\circ C$ (a) 1° Alcohol \rightarrow aldehyde (b) 2° Alcohol \rightarrow Ketone
(c) 3° Alcohol \rightarrow alkene
- Test of Phenolic group
 - soluble in NaOH – Insoluble in $NaHCO_3$ (Picric acid is only alcohol soluble in $NaHCO_3$)
 - Phenol gives red colour with alc. $FeCl_3$
 - Phenols – undergoes acetylation & Methylation.
- Test of ether linkage
 - Ethers – insoluble in H_2O . (b) with HI – gives alcohol and alkyl iodide
 - with excess HI – only alkyl iodide
- Test of Carbonyl groups
 - Phenyl hydrazine & HCl \rightarrow brown crystalline compound of phenyl hydrazone.
 - 2,4 – DNPH (Brady's reagent) \rightarrow Red ppt
 - NH_2OH/H^+ \rightarrow Oxime
 - Reduced to alkanes by
 - Wolff = Kishner reduction – NH_2NH_2/KOH
 - Clemenson reduction $\rightarrow Zn(Hg)/HCl$
- Test of aldehydes only
 - Red ppt with Fehling soln. – Cu_2O . (b) Red ppt with Benedict's soln. $\rightarrow Cu_2O$
 - Silver mirror (Ag) with Tollen's Reagent. (d) Pink colour with Schiff's reagent.
 - Aldol condensation – Aldehydes with α - Hydrogen with dil base – NaOH
 - Cannizzaro Reaction – aldehydes without no α – hydrogen with conc. NaOH/KOH.
- Test of Ketones
 - Wine red colour with sod. nitroprusside
 - aliphatic methyl ketones gives ppt with $NaHSO_3$. (c) On Reduction – gives 2° alcohol.

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8. Test of carboxylic acid
(a) With NaHCO_3 – effervescence of CO_2 (b) PCl_5 , PCl_3 , SOCl_2 acid chloride
(c) Amides with NH_3/Δ (d) Acetic acid gives blood red colour with FeCl_3
(e) HCOOH – also gives oxidation with
(i) Tollen's Reagent (ii) Fehling solution (iii) HgCl_2 (iv) Br_2
9. Test for dibasic acid
(a) Oxalic acid $\cdot\text{CO} + \text{CO}_2 + \text{H}_2\text{O}$ (b) Malonic acid $\rightarrow \text{CH}_3\text{COOH} + \text{CO}_2$
(c) Succinic acid \rightarrow Succinic anhydrides. (d) Maleic acid \rightarrow Maleic anhydrides
(e) Glutaric acid \rightarrow Lactones (f) Adipic acid \rightarrow Cyclo pentanone
10. Test of α -hydroxy acids \rightarrow on heating gives Lactides
Test of α -hydroxy acids – on heating undergoes dehydration to give α -unsaturated acid.
 $\text{R}-\text{CH}=\text{CH}_2-\text{COOH} + \text{H}_2\text{O}$
11. Test for Halo acids
(a) α -haloacids α -hydroxy acid (b) β -haloacid β -hydroxy acid
(c) γ and higher haloacids lactones
12. Test of Esters :
Esters are neutral, water insoluble compound, with fruity smell
Ester on reduction with LiAlH_4 or $\text{Na}/\text{C}_2\text{H}_5\text{OH}$ gives two mole of alcohol.
Ester on hydrolysis (saponification) gives acid and alcohol.
13. Test of Anhydrides :
(a) Anhydrides reacts with water to form two moles of acid.
(b) Anhydrides react with PCl_5 to form acid chloride.
(c) with NH_3 – form amide and acid.
(d) On reduction with LiAlH_4 – gives two moles of alcohol.
14. Test of aliphatic halogen compounds
All halides (except vinyl). when heated with aq. NaOH . followed by acidification and with AgNO_3
gives white, light yellow or dark yellow ppt.
15. Test for amines :
1. All amines are basic in nature.
2. All amines are soluble in acids.
3. Reacts with excess RCl to form quaternary ammonium halides.
4. With NaNO_2/Cl or HNO_2
(a) aliphatic – P -amines form alcohol and alkene and evolve N_2 gas. (except – CH_3-NH_2)
(b) Aromatic – p -amine gives di-azonium salt ($0-50^\circ\text{C}$). Alkaline soln. of β -Naphthol gives red to orange coloured dye with diazonium salt.
(c) Secondary amine : Form yellow emulsion of N -Nitrosoamine. N - nitrosoamine with a crystal of phenol and few drops of conc. H_2SO_4 produces intense blue colour. (Lieberman's Nitroso Reaction)
16. Reaction given by only primary and secondary amine.
(a) 1° & 2° amines are acetylated acid benzoylated.
(b) evolve H_2 gas with Na metal.
(c) gives alkane with G.R.
(d) gives N -halogenated amines with halogen/ NaOH .
17. Reaction given by 1° amines only.
(a) Carbyl amine test all 1° amines when heated with CHCl_3 and alc. KOH form isocyanides (Foul smelling odour).

GRAVITY CLASSES

- (b) Haloform mustard oil reaction – 1° amine when heated with CS_2 and HgCl_2 form isothiocyanates having smell of mustard oil.
18. Test for Cyanides
- (a) Cyanides on reduction with $\text{LiAlH}_4/\text{Na}/\text{C}_2\text{H}_5\text{OH}$ or H_2/Ni form 1° amines.
- (b) Cyanides on hydrolysis gives carboxylic acid and ammonia.
19. Test for Isocyanides
- (a) Isocyanides on reduction with $\text{LiAlH}_4/\text{Na}/\text{C}_2\text{H}_5\text{OH}$ or H_2/Ni form secondary methyl amine.
- (b) Isocyanides on hydrolysis gives p- amines and HCOOH .
20. Test for aliphatic nitro compound
- (a) Reduction with Sn/HCl (acidic medium) – 1° amine.
- (b) Reduction in neutral medium $\text{Zn}/\text{NH}_4\text{Cl}$ or Sn/CaCl_2 –Hydroxylamine
- (c) On reaction with $\text{NaNO}_2/\text{conc. H}_2\text{SO}_4$
1°-nitro – nitrolic acid – red soln. in NaOH
2°-nitro– Pseudonitrol–blue soln.
21. Alkyl nitrite R-O-NO .
- (a) on Redn. gives alcohol (Sn/HCl)
- (b) on hydrolysis gives alcohol
22. Test for amides
- (a) Smell of ammonia on heating.
- (b) amides gives 1° amine with LiAlH_4
- (c) Amides gives cyanides with P_2O_5