Practical

Practical — Edited 10h ago

Organic QA Reference Table

Reagents & Conditions	Functional groups	Observations	Remarks
Ethanolic $AgNO_3$, heat / NaOH, heat → cool, excess aqueous HNO_3 → aqueous $AgNO_3$	**Acyl chloride**	White ppt formed immediately (even under cold condition)	
	Chloroalkane	White ppt [1]	
	Bromoalkane	Cream ppt [1]	
	Iodoalkane	Yellow ppt	
Neutral aqueous $FeCl_3$	**Phenol**	Violet colour	
2,4-DNPH	**Aldehyde**	Orange ppt	
	Ketone	Orange ppt	
Tollens' reagent, heat	**Aldehyde**	Silver mirror (Ag metal)	Tollens' reagent contains $[Ag(NH_3)_2]^+$ complex that can be reduced to Ag metal
Fehling's reagent, heat	**Aldehyde (except for benzaldehyde)**	Reddish-brown ppt	Fehling's reagent contains a copper (II) complex in an alkaline solution. The complexed copper (II) ion is reduced to Cu_2O
Aqueous Na_2CO_3 / Aqueous $NaHCO_3$	**Carboxylic acid**	Effervescence of CO_2 gas	
	Acyl chloride	Effervescence of CO_2 gas [2]	
Aqueous I_2, aqueous NaOH, warm	**Aldehydes and ketones with -$COCH_3$ structure**	Yellow CHI_3 ppt	CHI_3 is known as tri-iodomethane / iodoform → the test is a.k.a. tri-iodomethane test / iodoform test
	Any compound with -$CH(OH)CH_3$ structure	Yellow CHI_3 ppt	
Aqueous Br_2 / Liquid Br_2 / Br_2 in CCl_4	**Alkene**	Orange aqueous Br_2 decolourised / Reddish-brown Br_2 decolourised / Orange-brown Br_2 in CCl_4 decolourised	
	Phenol	Orange aqueous Br_2 decolourised / Reddish-brown Br_2 decolourised /	There is no need to record the presence of white ppt[3] unless the question wants 2 observations

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Reagents & Conditions	Functional groups	Observations	Remarks
	Phenylamine	Orange aqueous Br_2 decolourised / Reddish-brown Br_2 decolourised / Orange-brown Br_2 in CCl_4 decolourised	There is no need to record the presence of white ppt[3] unless the question wants 2 observations
Na metal	**Alcohol**	Effervescence of H_2 gas	
	Phenol	Effervescence of H_2 gas	
	Carboxylic acid	Effervescence of H_2 gas	
PCl_5	**Alcohol**	(Dense) white fumes (HCl fumes)	PCl_5 is a solid at room temperature
	Carboxylic acid	(Dense) white fumes (HCl fumes)	PCl_5 is a solid at room temperature
$SOCl_2$, warm	**Alcohol**	(Dense) white fumes (HCl fumes) & pungent SO_2 gas	
	Carboxylic acid	(Dense) white fumes (HCl fumes) & pungent SO_2 gas	
Aqueous $K_2Cr_2O_7$, aqueous H_2SO_4, heat	**Aldehydes**	Orange aqueous $K_2Cr_2O_7$ turned to green	
	Primary and secondary alcohols	Orange aqueous $K_2Cr_2O_7$ turned to green	
Aqueous $KMnO_4$, aqueous H_2SO_4, heat	**Alkene**	Purple $KMnO_4$ decolourised	Compounds with $=CH_2$ or =CHCH= structure would also give "effervescence of CO_2 gas"
	Alkylbenzene or any compound with C_6H_5CH-structure	Purple $KMnO_4$ decolourised	Ethylbenzene is an example of alkylbenzene that would give "effervescence of CO_2 gas"
	Primary and secondary alcohols	Purple $KMnO_4$ decolourised	
	Aldehyde	Purple $KMnO_4$ decolourised	
	Methanoic acid HCO_2H & Ethanedioic acid HO_2C-CO_2H	Purple $KMnO_4$ decolourised, effervescence of CO_2 gas	

1 Follow-up test to differentiate white ppt (AgCl) from cream ppt (AgBr):

1. Follow-up test to differentiate white ppt (AgCl) from cream ppt (AgBr):
Add dilute aqueous NH_3 → AgCl completely dissolves in aqueous NH_3 whilst AgBr only partially dissolves in NH_3

2. Why can acyl chloride also give positive results when Na_2CO_3 / $NaHCO_3$ is added?
Acyl chloride reacts with water to give carboxylic acid and HCl → both acids react with Na_2CO_3 / $NaHCO_3$ to give CO_2 gas

3. The white ppt is actually the organic product formed due to the reaction between phenol / phenylamine and Br_2 (electrophilic substitution)

- **Effervescence** of gas vs **evolution** of gas
  - The choice of word depends on the solubility of the gas
    - If the gas is very soluble (e.g., NH_3), then it would be "gas evolved" because you need to heat the content to make the gas bubbles appear
    - If the gas is not very soluble (e.g., CO_2) and no heating was done, then it would be effervescence

- **Glowing** splint vs **lighted** splint
  - Glowing splint is to test O_2
  - Lighted splint is to test H_2

- After you **filter** the mixture, the observation **must** include 2 parts
  - *<Colour>* filtrate obtained
- *<Colour>* residue obtained