Organic Chemistry Revision Sheets
Functional Groups Tests

Alcohols

TEST: Warm with acidified potassium dichromate (VI), $Cr_2O_7^{2-}$ / H^+

RESULT: Solution will change colour from **orange** to **green**

$$3ROH + Cr_2O_7^{2-}(aq) + 14H^+(aq) \xrightarrow{warm} 3RHO + 2Cr^{3+}(aq) + 7H_2O(l)$$

orange solution → *green solution*

Alcohol → Aldehyde or Ketone

Aldehydes

TEST: Heat with **Tollens' Reagent**

RESULT: **Silver mirror** will form

$$RHO + 2Ag(NH_3)_2^+(aq) + 3OH^-(aq) \xrightarrow{warm} 2Ag(s) + ROO^- + 4NH_3(aq) + 2H_2O(l)$$

silver (solid)

Aldehyde → Carboxylate Ion

TEST: Heat with **Fehling's solution**

RESULT: **Brick red** precipitate will form

$$RHO + 2Cu^{2+}(aq) + 5OH^-(aq) \xrightarrow{warm} Cu_2O(s) + ROO^- + 3H_2O(l)$$

Copper (I) Oxide (solid)

Aldehyde → Carboxylate Ion

Alkenes

TEST: Addition of Bromine Water

RESULT: Solution will change colour from **orange-brown** to **colourless**

$$C_nH_{2n} + Br_2(aq) \longrightarrow C_nH_{2n}Br_2$$

Alkene → Dibromoalkane

Carboxylic Acid

TEST: Addition of Sodium Carbonate

RESULT: Effervesence, gas produced turns lime-water from colourless to cloudy

$$RCOOH + CO_3^{2-}(aq) \longrightarrow RCOO^-(aq) + CO_2(g) + H_2O(l)$$

Carboxylic Acid → Carboxylate Ion

Halogenoalkane (haloalkane)

TEST: Addition of hydroxide ions (in ethanol), followed by (dilute) nitric acid and silver nitrate ($AgNO_3$)

RESULT: Coloured precipitate forms

$$RX + OH^- \longrightarrow ROH + X^-$$

Halogenoalkane → Alcohol

$$X^-(aq) + Ag^+(aq) \longrightarrow AgX(s)$$

AgCl(s) = white ppt, AgBr(s) = cream ppt and AgI(s) = yellow ppt