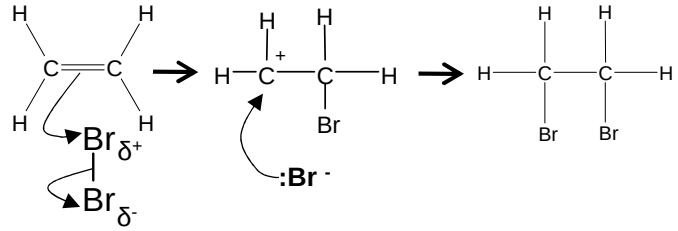
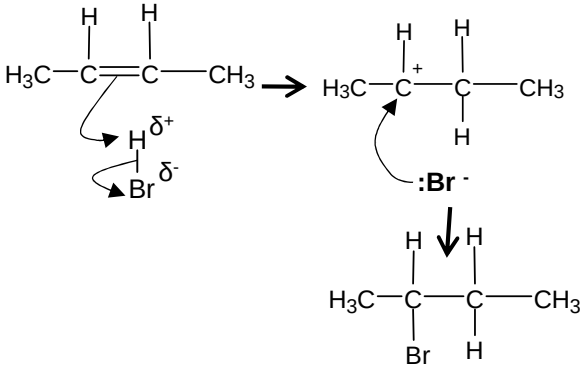
N Goalby chemrevise.org

Mechanism Summary for A-level AQA Chemistry

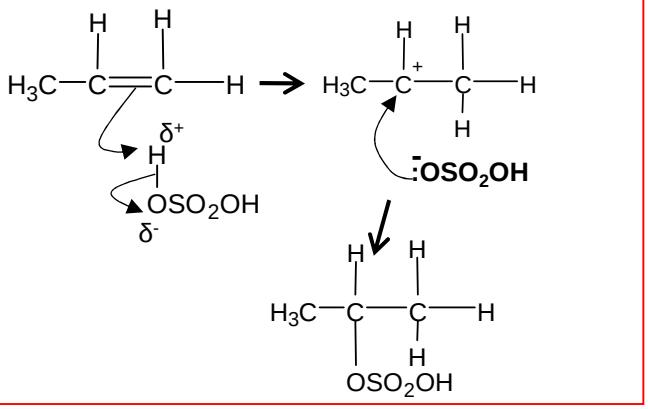
Electrophilic Addition of alkenes with bromine



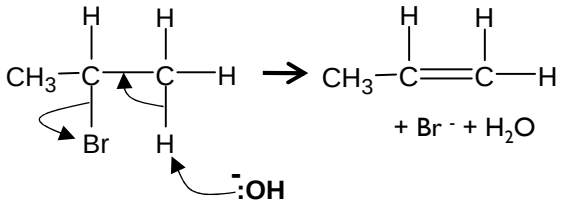
Electrophilic Addition of alkenes with hydrogen bromide



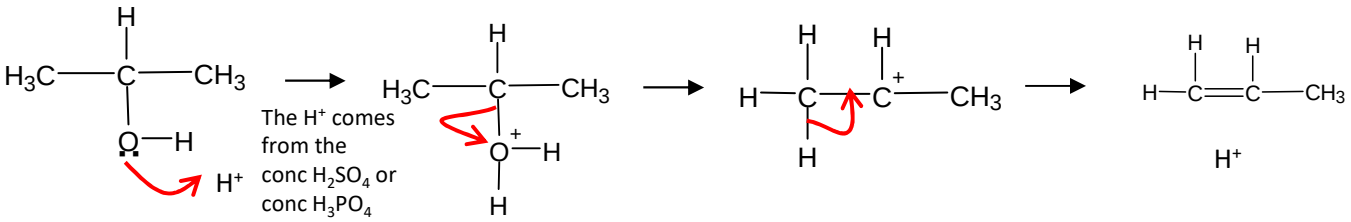
Electrophilic Addition of alkenes with sulfuric acid



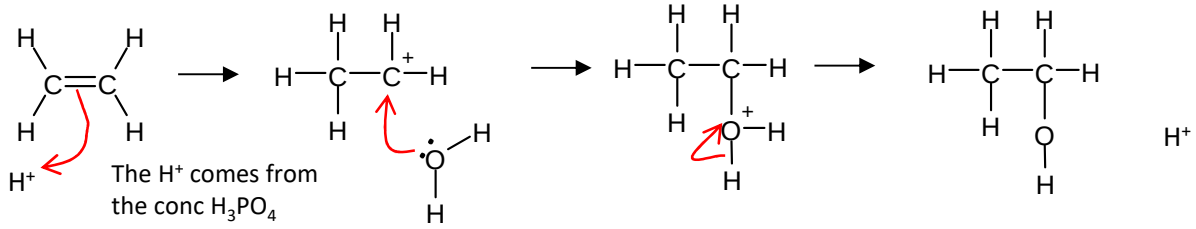
Elimination of halogenoalkanes with ethanolic hydroxide ions



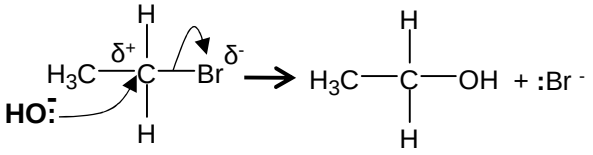
Acid catalysed elimination mechanism: alcohols → alkenes



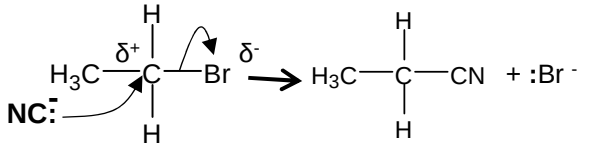
Acid catalysed addition mechanism for hydration of ethene



Nucleophilic Substitution of halogenoalkanes with aqueous hydroxide ions.



Nucleophilic Substitution of Halogenoalkanes with cyanide ions.



Free Radical Substitution of alkanes with bromine

STEP ONE Initiation

Essential condition: UV light

$Br_2 \rightarrow 2Br^{\cdot}$

STEP TWO Propagation

$CH_3CH_3 + Br^{\cdot} \rightarrow HBr + CH_3CH_2^{\cdot}$

$CH_3CH_2^{\cdot} + Br_2 \rightarrow CH_3CH_2Br + Br^{\cdot}$

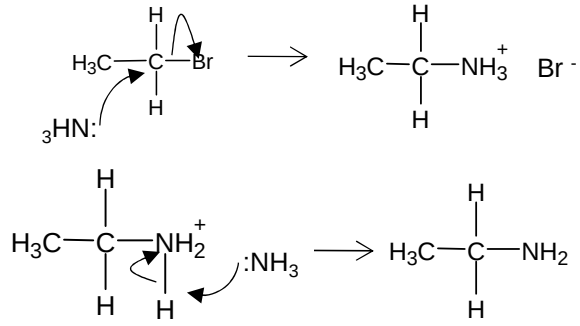
STEP THREE Termination

$CH_3CH_2^{\cdot} + Br^{\cdot} \rightarrow CH_3CH_2Br$

$CH_3CH_2^{\cdot} + CH_3CH_2^{\cdot} \rightarrow CH_3CH_2CH_2CH_3$

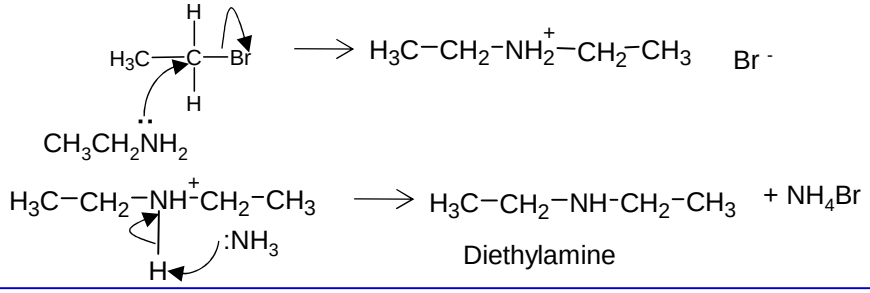
Nucleophilic Substitution reactions of ammonia/amines

Reaction 1 with ammonia forming primary amine



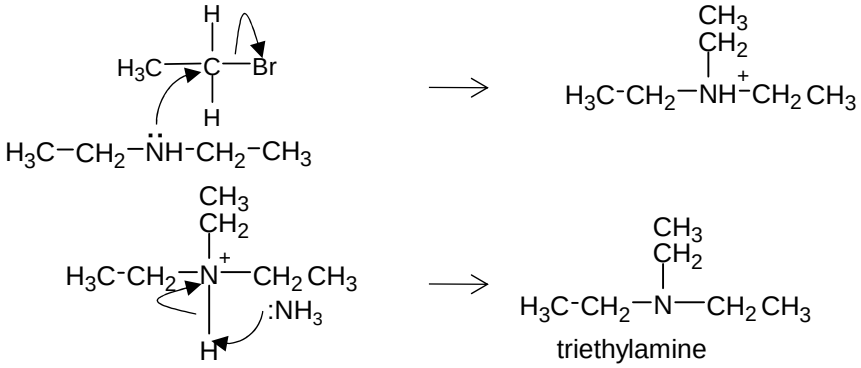
Reaction 2 forming secondary amine

The amine formed in the first reaction has a lone pair of electrons on the nitrogen and will react further with the haloalkane.



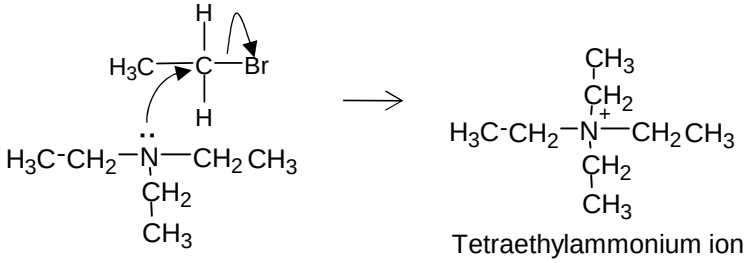
Diethylamine

Reaction 3 forming a tertiary amine



triethylamine

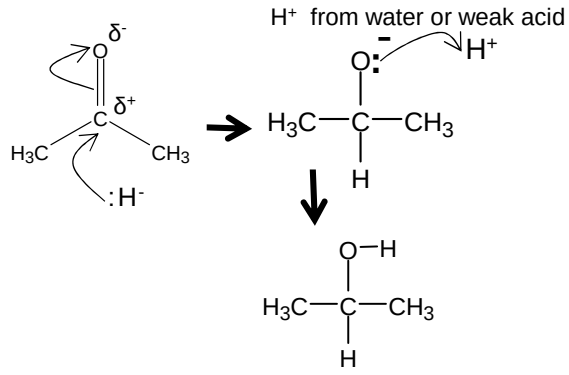
Reaction 4 forming a quaternary ammonium salt



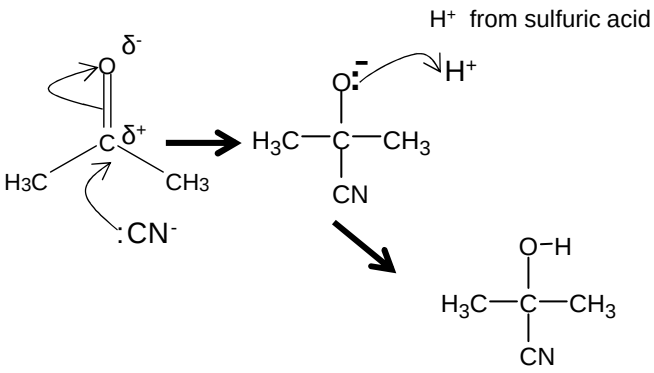
Tetraethylammonium ion

Mechanism Summary for A-Level AQA Chemistry

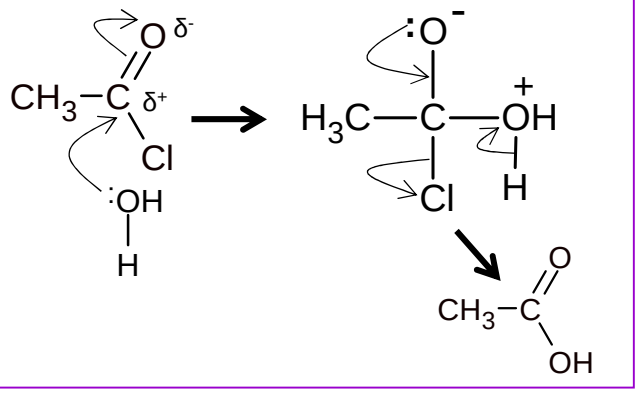
Nucleophilic Addition Mechanism



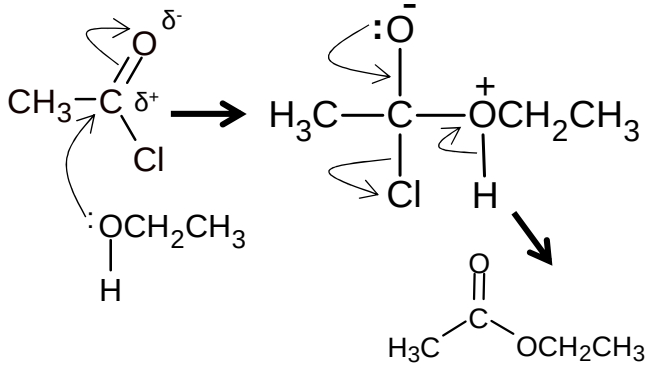
Nucleophilic Addition Mechanism



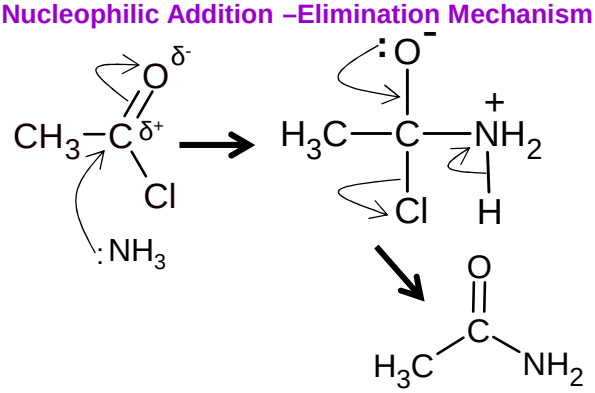
Nucleophilic Addition –Elimination Mechanism



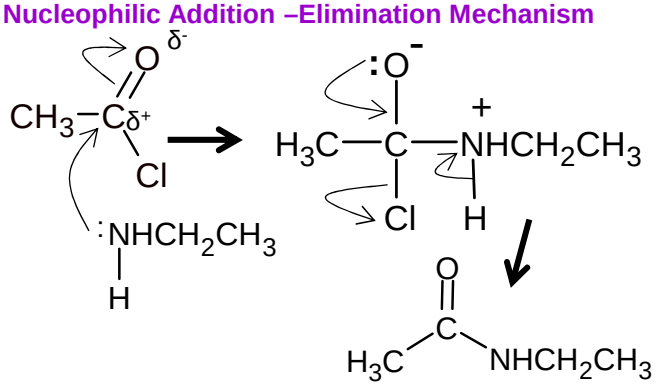
Nucleophilic Addition –Elimination Mechanism



Nucleophilic Addition –Elimination Mechanism



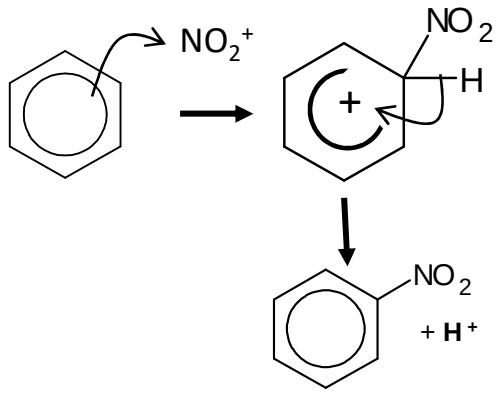
Nucleophilic Addition –Elimination Mechanism



Electrophilic Substitution

Equation for formation of electrophile

$HNO_3 + 2H_2SO_4 \rightarrow NO_2^+ + 2HSO_4^- + H_3O^+$

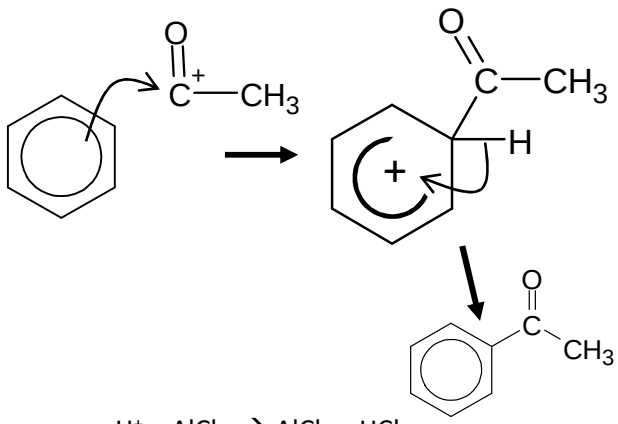


$H^+ + HSO_4^- \rightarrow H_2SO_4$

Electrophilic Substitution

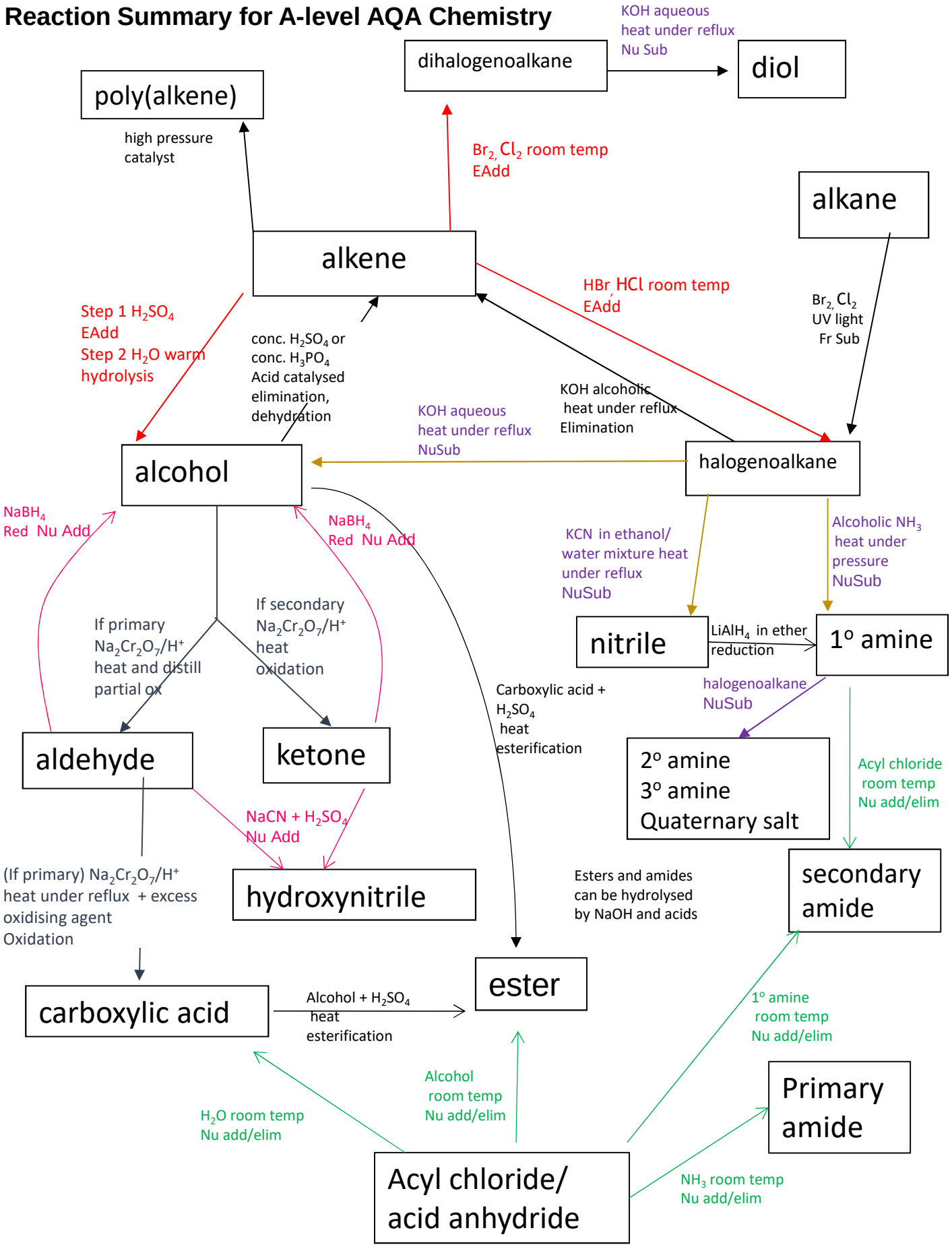
Equation for formation of the electrophile.

$AlCl_3 + CH_3COCl \rightarrow [CH_3CO]^+ + [AlCl_4]^-$



$H^+ + AlCl_4^- \rightarrow AlCl_3 + HCl$

Reaction Summary for A-level AQA Chemistry



Aromatic synthetic routes