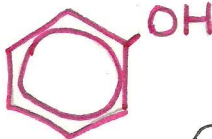


PHENOL

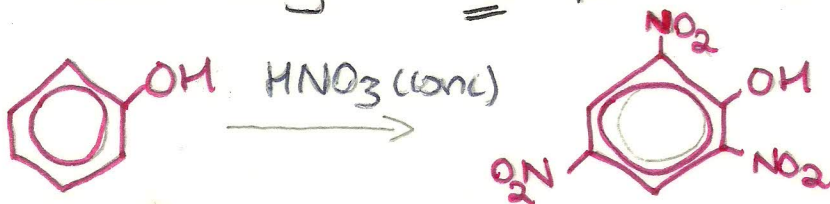
electrophilic substitution



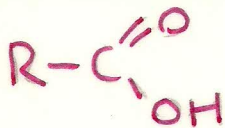
Test for Phenols:

Add Iron(III) - chloride \rightarrow Purple colour.

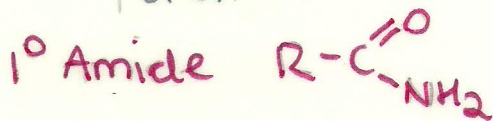
All reactions of **ARENES** but intensified by presence of -OH group. Multiple substitutions are likely. i.e for Nitration



Carboxylic Acid



Hydrolysis \uparrow H_2O/H^+
or OH^-



+ NH_3

careful!
 NH_3 will
attack $-OH$
group

Carbon chain
Extension

Hydrolysis \uparrow H_2O/H^+
or OH^-

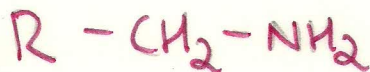
NITRILE



Reduction



1° Amine

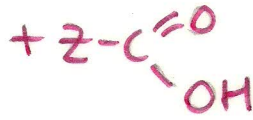
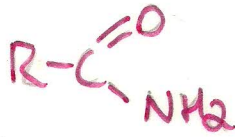
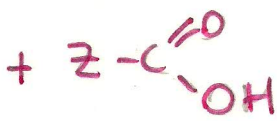
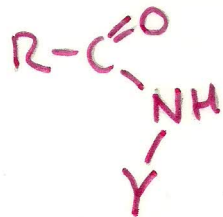


N.B $-CN$

and CN^-

are:





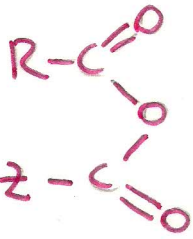
2° Amide

1° Amide

nucleophilic substitution

nucleophilic substitution

ACID ANHYDRIDE



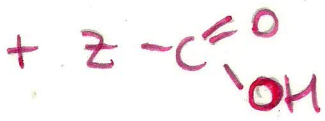
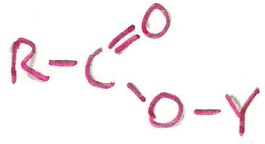
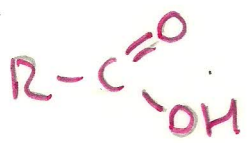
nucleophilic substitution

nucleophilic substitution

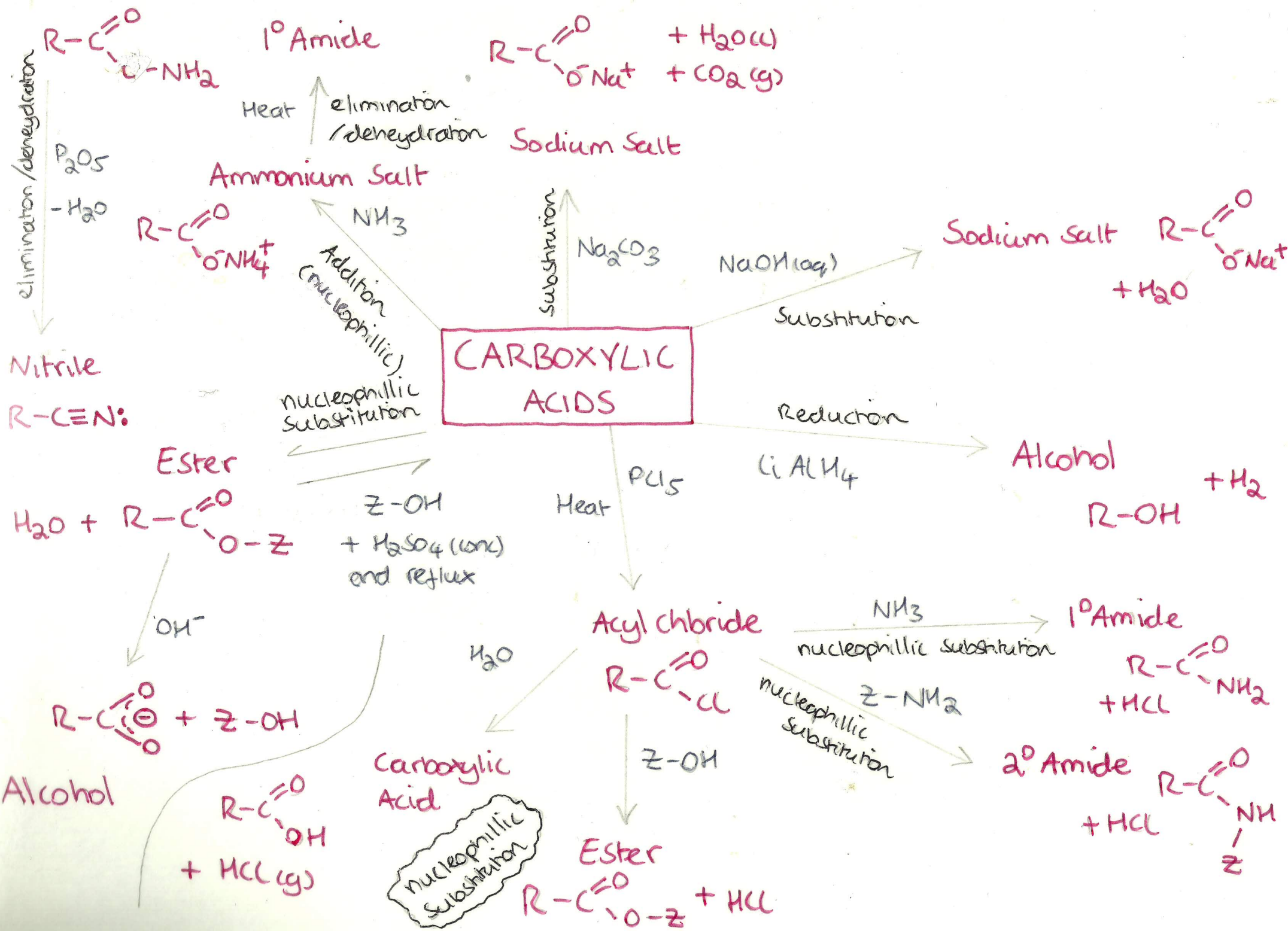


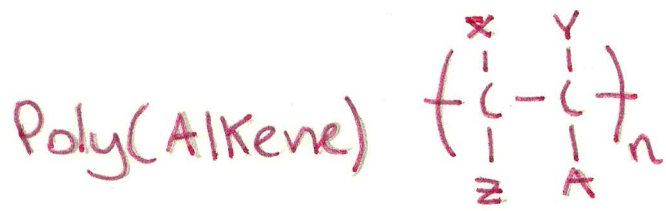
Carboxylic Acids

Ester



ACID ANHYDRIDES can be used as an alternative to ACYL CHLORIDES





ALKENE

Polymerisation with H_2SO_4 (conc) then boil with H_2O .

Peroxide initiator (radicals) + uv light

Alcohol

electrophillic addition

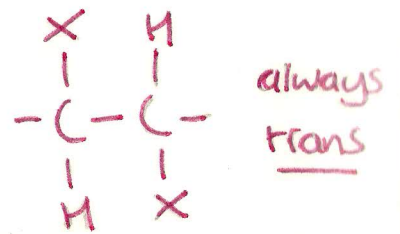
Alkane

reduction

Raney Ni cat.

H_2 (g)

+ Heat, Pressure



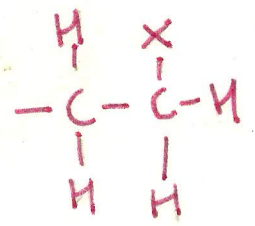
Addition (electrophillic)

Halogen (Cl_2)

Di-Halogenoalkane

peroxides \rightarrow free radical [initiat] + uv light

Antimarkovnikov addition



oxidation

$\text{KMnO}_4 / \text{H}^+$ (always cis)

Diol (Alcohol)

Markovnikov electrophillic addition (no light)

Combustion

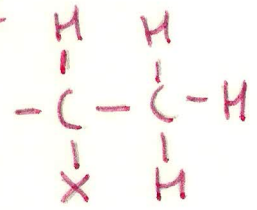
O_2 (g)

+ heat

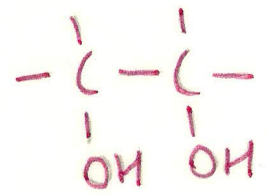


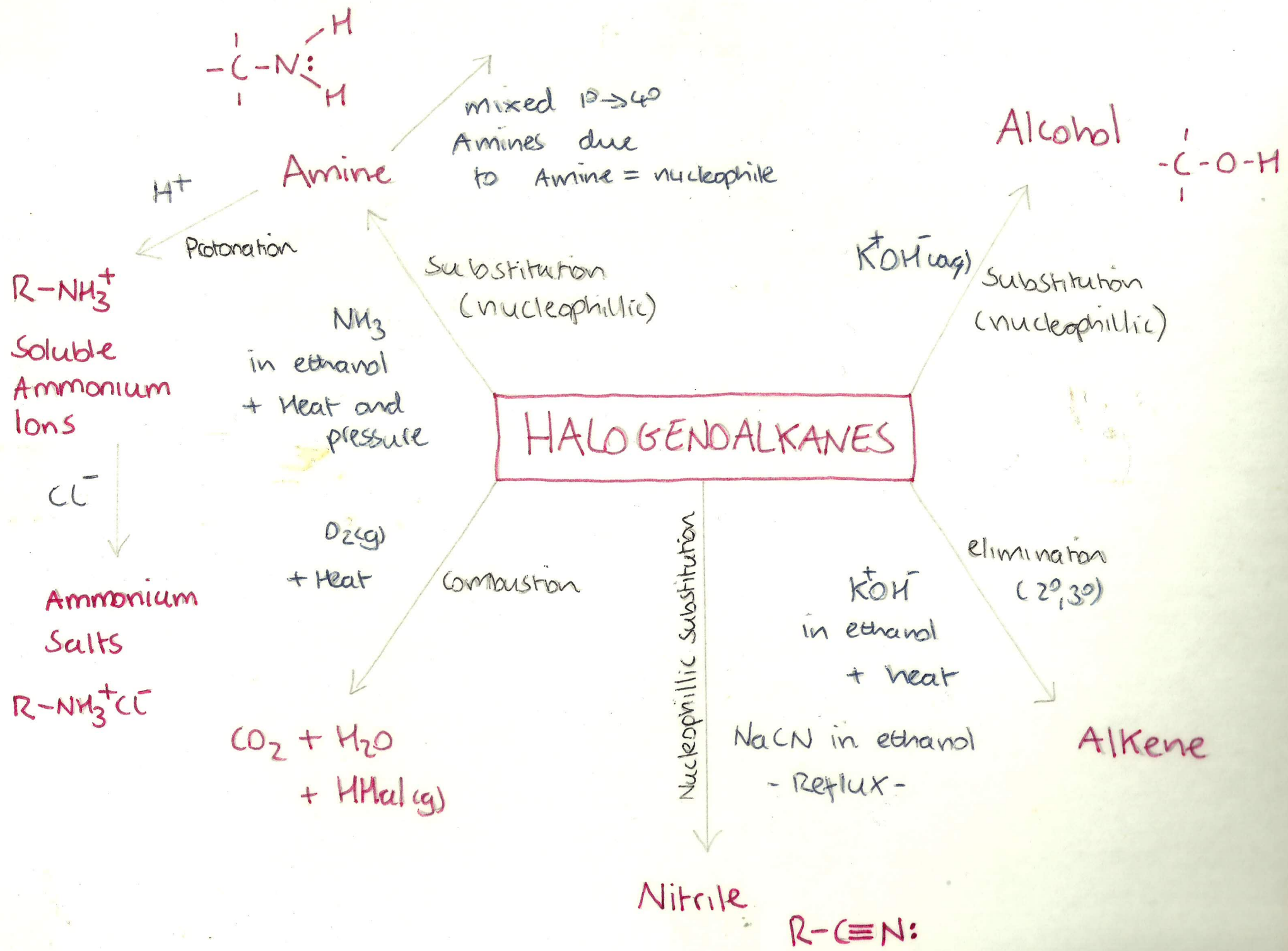
HHal (g) \rightarrow dry gas in solvent

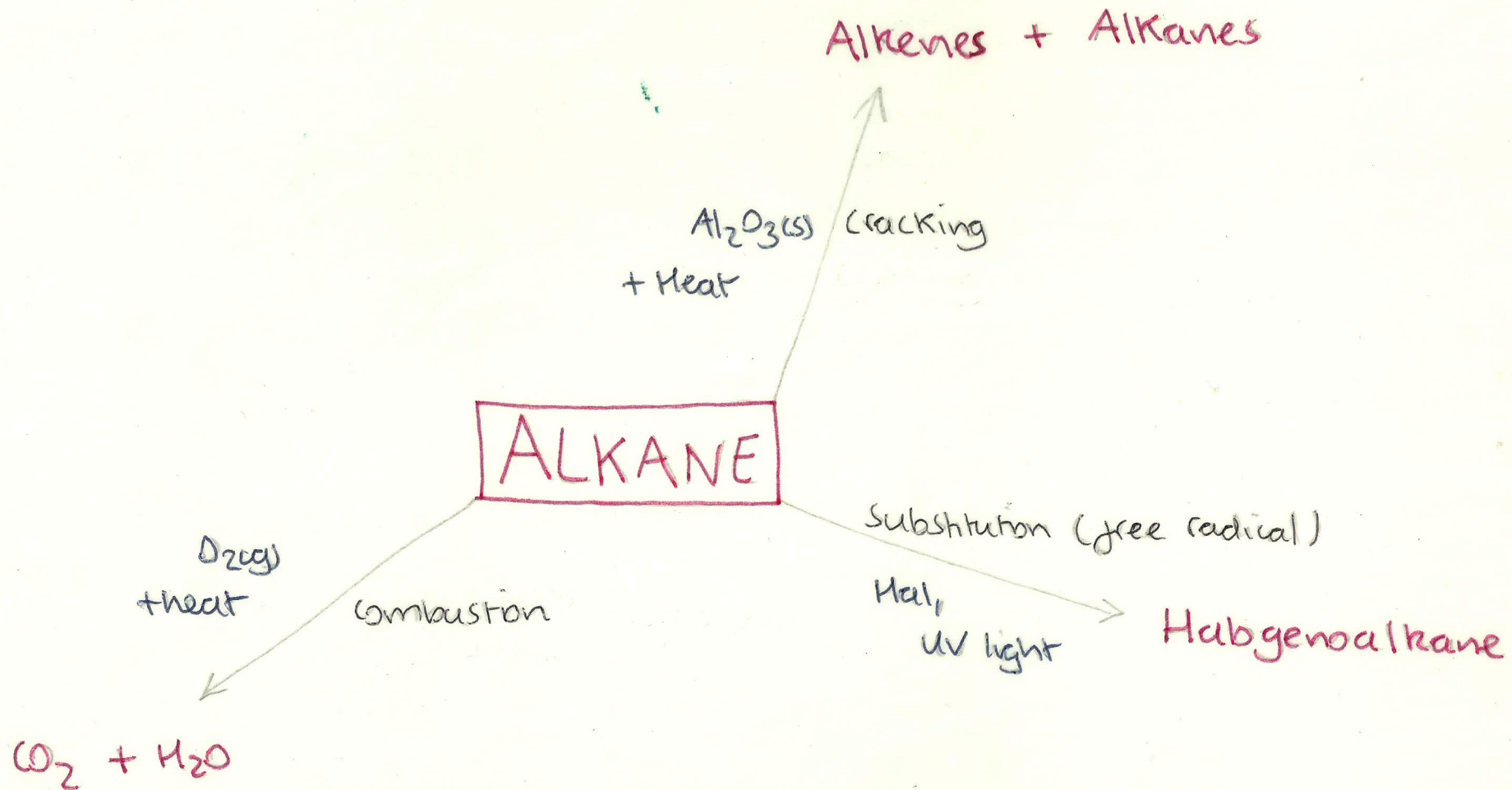
Mono-Halogenoalkane

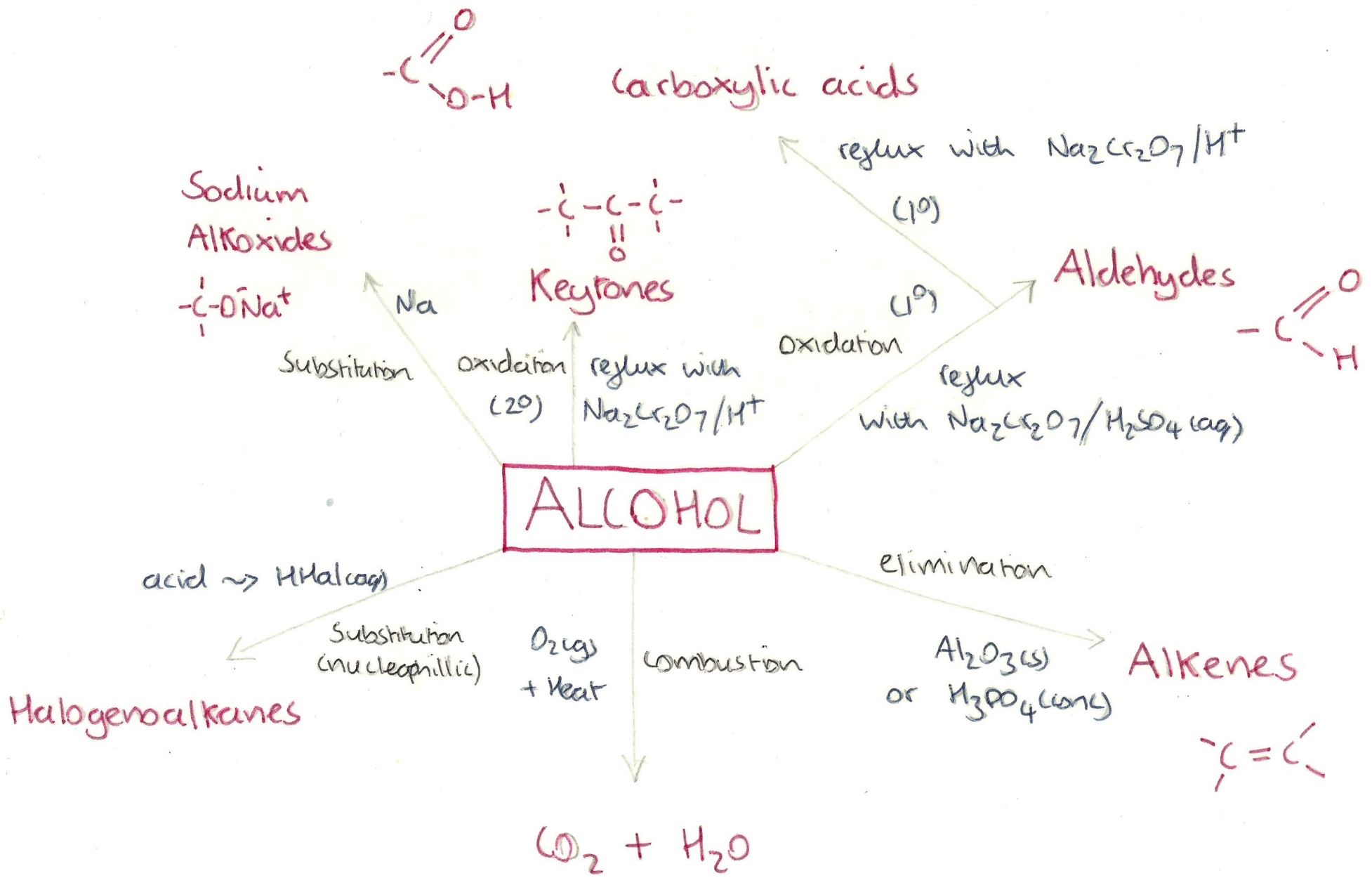


(most protonated carbon is protonated)

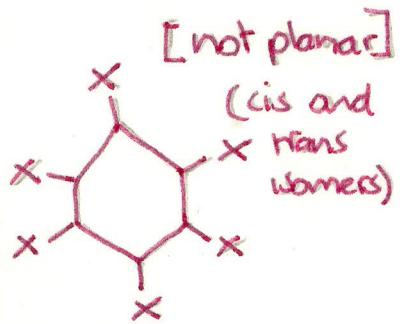






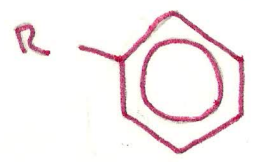


Not used in name
↓



'cyclo' Hal-Alkane
↖ X

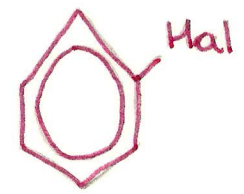
R → Alkyl-[Arene]



Alkyl-Hal
+ AlCl₃
cat.

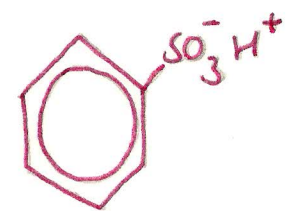
FRIEDEL-CRAFTS REACTION
Substitution (Alkylation)

Hal-[Arene]



Fe cat
Hal₂

Substitution (Halogenation)



long reflux with fuming H₂SO₄

Sulphonation ()

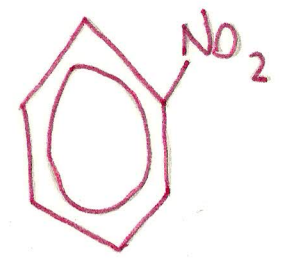
[Arene]-Sulphonic acid

addition (free radical)
Boil Arene
→ Hal₂ + UV light

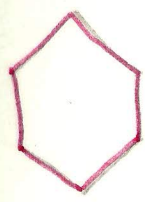
ARENE

Nitration (Substitution: electrophilic)

Nitro-[Arene]



cyclo alkane



addition
Heat, pressure
H₂(g)
+ Raney Ni
cat.

Combustion
O₂(g)
+ Heat

CO₂ + H₂O

conc. HNO₃ and
conc H₂SO₄

Arene could be Benzene :

