Carbon-Carbon Bonds Map

OCR A Level Chemistry A · 6.2.4 Carbon-carbon bond formation

1 One more carbon

6.2.4(a)

- New C–C bond
- CN adds **one** carbon
- Count it in the name
- Two ways in



2 From a haloalkane

6.2.4(b)

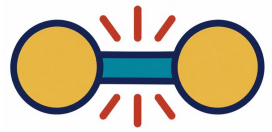
- CN^- and ethanol
- Heat under reflux
- Nucleophilic substitution
- C–Br breaks

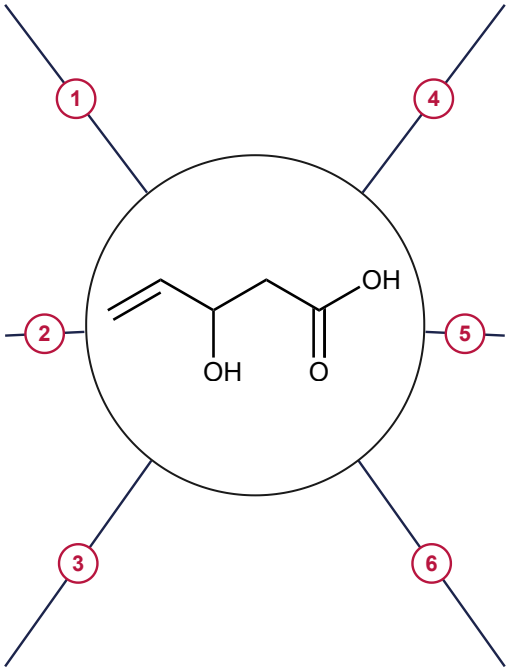


3 From a carbonyl

6.2.4(b)

- HCN from NaCN and H^+
- CN^- attacks δ+ C
- Nucleophilic addition
- A hydroxynitrile

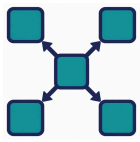




4 Reducing a nitrile

6.2.4(c)

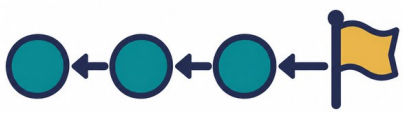
- H_2 over nickel
- Two H_2 per C≡N
- Gives an **amine**
- RCH_2NH_2



5 Hydrolysing a nitrile

6.2.4(c)

- Dilute HCl, reflux
- Gives an **acid**
- N leaves as NH_4^+
- Keeps the CN carbon



6 Friedel–Crafts

6.2.4(d)

- Haloalkane: alkylation
- Acyl chloride: acylation
- Halogen carrier
- Electrophilic substitution



Forming and using C–C bonds

reagent and conditions

Change	Reagent	Conditions
Haloalkane to nitrile	CN^-	Ethanol, reflux
Carbonyl to hydroxynitrile	NaCN, H^+	Room temperature
Nitrile to amine	H_2	Ni catalyst
Nitrile to acid	Dilute HCl	Reflux
Benzene to alkylbenzene	RCl	$AlCl_3$ carrier

Worked examples

Add one carbon: acid

- Bromoethane to propanoic acid
- CN^-, ethanol: a nitrile
- **Dilute HCl**, reflux

Add one carbon: amine

- Bromoethane to propylamine
- CN^-, ethanol: a nitrile
- **H_2/Ni**

Name the product

- Ethanal + HCN
- $CH_3CH(OH)CN$
- **2-hydroxypropanenitrile**

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