Grignard and Routes Map

Edexcel A Level Chemistry · Topic 18C Grignard Reagents and Routes

1 Making a Grignard

18C.20

- RBr + Mg: **RMgBr**
- Reflux in **dry ether**
- Water destroys it
- R acts as a nucleophile



2 A longer chain

18C.20

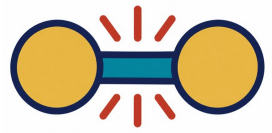
- CO_2: one more carbon
- Then dilute acid
- Gives RCOOH
- KCN also adds one

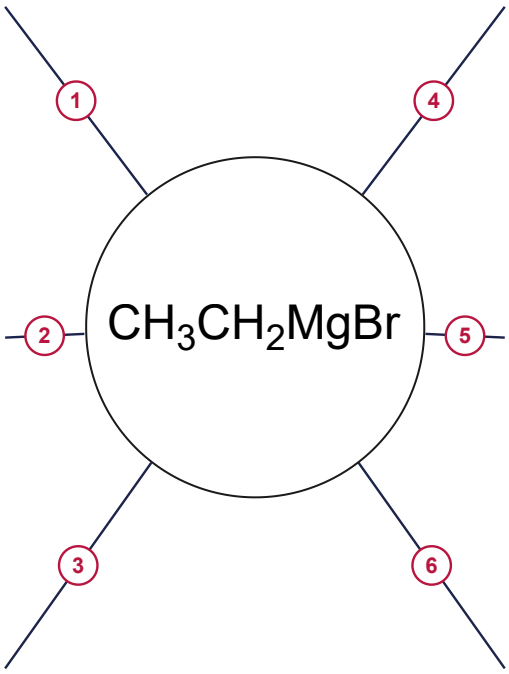


3 New C–C bonds

18C.20

- R attacks the C=O carbon
- Methanal: 1° alcohol
- Aldehyde: 2° alcohol
- Ketone: 3° alcohol

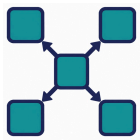




4 Aliphatic routes

18C.19

- Know each junction
- Alkene, alcohol, RX
- Acid, RCOCl, ester, amide
- Reagent and **conditions**



5 Aromatic routes

18C.19

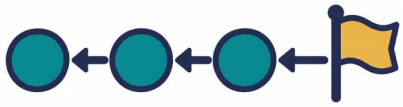
- Nitrate, then reduce
- Friedel–Crafts adds C
- Acyl chloride: an amide
- Ring stays intact



6 Working backwards

18C.19

- Start at the **target**
- Which bond was last?
- Up to four steps
- Yields **multiply**



Grignard reagents

dry ether, then dilute acid

RMgBr with	Product	Type
CO_2	RCOOH	Carboxylic acid
HCHO	RCH_2OH	Primary alcohol
R′CHO	RCH(OH)R′	Secondary alcohol
R′COR″	RC(OH)R′R″	Tertiary alcohol

Worked examples

Grignard product

- CH_3CH_2MgBr + CH_3CHO
- Dry ether, then acid
- **Butan-2-ol**

Add one carbon

- Bromoethane to acid
- Mg, CO_2, then acid
- **CH_3CH_2COOH**

Overall yield

- 85.0% then 60.0%
- 0.850 × 0.600
- **51.0%**

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