Amines Map

Cambridge International · Topic 34 Amines and phenylamine

1 Making amines

34.1.1

- RX + NH_3 in ethanol
- Heat under pressure
- Nitrile: $LiAlH_4$ or H_2/Ni
- Amide: $LiAlH_4$



2 Phenylamine

34.2.1

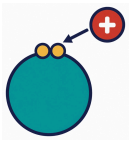
- Nitrate benzene first
- Hot Sn + conc HCl
- Then NaOH(aq)
- 6[H]: gives $2H_2O$ too

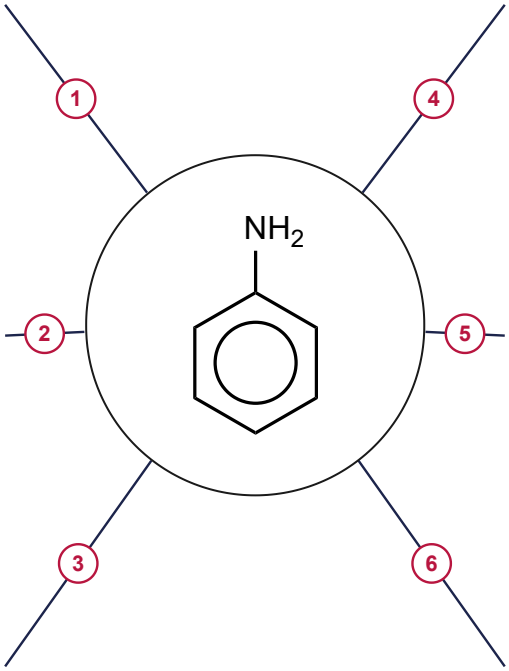


3 Bases

34.1.3, 34.2.3

- N lone pair accepts H^+
- Ethylamine strongest
- Then ammonia
- Phenylamine weakest

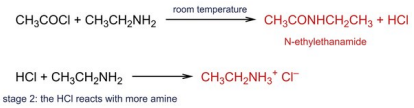




4 Amides from RCOCl

34.1.2

- Room temperature
- NH_3 or an amine
- N attacks C=O
- HCl removed by base



$HCl + CH_3CH_2NH_2 \longrightarrow CH_3CH_2NH_3^+ Cl^-$

stage 2: the HCl reacts with more amine

5 Bromine water

34.2.2

- Room temperature
- Orange colour goes
- **White precipitate**
- $3Br_2$: 2,4,6- product



6 Diazonium and dyes

34.2.2, 34.2.4

- $NaNO_2$ + dilute acid
- Below 10 °C
- Warm with water: phenol
- Phenol in NaOH: azo dye



Routes and reactions

making amines and using phenylamine

Start	Reagent	Product
Halogenoalkane	NH_3 in ethanol	Primary amine
Nitrile	$LiAlH_4$ or H_2/Ni	Primary amine
Nitrobenzene	Hot Sn + conc HCl, NaOH	Phenylamine
Phenylamine	Br_2(aq)	2,4,6-tribromophenylamine
Phenylamine	HNO_2, below 10 °C	Diazonium salt

Worked examples

Yield

- 12.3 g $C_6H_5NO_2$: 0.100 mol
- 6.51 g product: 0.0700 mol
- **70.0%**

Moles of Br_2

- 4.65 g phenylamine
- 0.0500 mol × 3
- **0.150 mol**

Dye Mr

- $C_6H_5N{=}NC_6H_4OH$
- $C_{12}H_{10}N_2O$
- **198**

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