

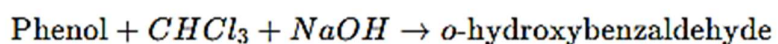
NAMED REACTIONS WITH MECHANISMS

1. Reimer–Tiemann Reaction

Chapter: Alcohols, Phenols & Ethers

Reaction

Phenol $\rightarrow$ o-Hydroxybenzaldehyde (major)



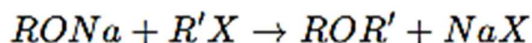
Mechanism (Key Steps)

1. $\text{CHCl}_3 + \text{OH}^- \rightarrow \text{:CCl}_2$ (dichlorocarbene)
2. Electrophilic substitution on phenoxide ion
3. Hydrolysis $\rightarrow$ aldehyde formation

2. Williamson Ether Synthesis

Chapter: Alcohols, Phenols & Ethers

Reaction



Mechanism

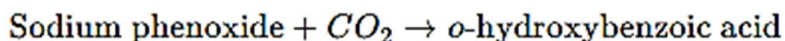
- $\text{S}_{\text{N}}2$ reaction
- Alkoxide ion attacks primary alkyl halide
- Inversion of configuration

⚠ Use primary halide only

3. Kolbe's Reaction

Chapter: Alcohols, Phenols & Ethers

Reaction



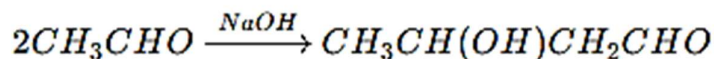
Mechanism

- Electrophilic substitution of CO_2
- Followed by acidification

4. Aldol Condensation

Chapter: Aldehydes & Ketones

Reaction



Mechanism

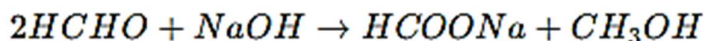
1. Enolate ion formation
2. Nucleophilic addition
3. Dehydration (on heating)

5. Cannizzaro Reaction

Chapter: Aldehydes & Ketones

Reaction

(Aldehydes without $\alpha\text{-H}$)



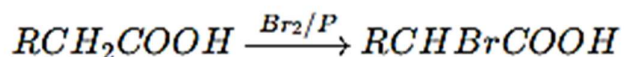
Mechanism

- Hydride transfer
- One molecule oxidised, one reduced

6. Hell-Volhard-Zelinsky (HVZ) Reaction

Chapter: Carboxylic Acids

Reaction



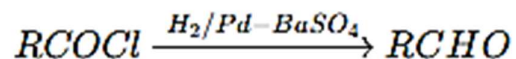
Mechanism

1. Formation of acyl bromide
2. α -Bromination
3. Hydrolysis

7. Rosenmund Reduction

Chapter: Aldehydes & Ketones

Reaction



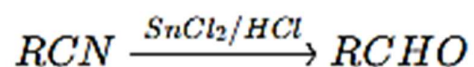
Mechanism

- Controlled catalytic hydrogenation
- Catalyst poisoned to prevent over-reduction

8. Stephen Reduction

Chapter: Aldehydes

Reaction



Mechanism

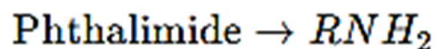
- Formation of iminium salt
- Hydrolysis to aldehyde

9. Gabriel Phthalimide Synthesis

Chapter: Amines

Reaction

Preparation of primary amines only



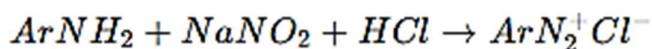
Mechanism

- SN2 substitution
- Hydrolysis releases primary amine

10. Diazotisation Reaction

Chapter: Amines

Reaction



Mechanism

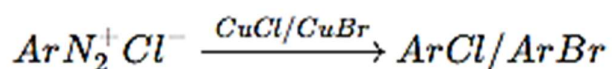
- Formation of nitrosonium ion
- Attack on amine $\rightarrow$ diazonium salt

(Temperature: 0–5°C)

11. Sandmeyer Reaction

Chapter: Amines

Reaction



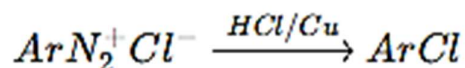
Mechanism

- Radical substitution
- Loss of N_2 gas drives reaction

12. Gattermann Reaction

Chapter: Amines

Reaction

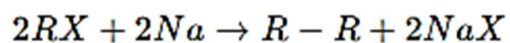


Similar to Sandmeyer but without Cu salt

13. Wurtz Reaction

Chapter: Haloalkanes

Reaction



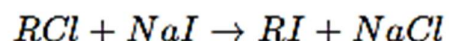
Mechanism

- Free radical coupling
- Occurs in dry ether

14. Finkelstein Reaction

Chapter: Haloalkanes

Reaction



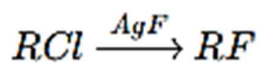
Mechanism

- SN2 reaction
- Driven by precipitation of NaCl

15. Swarts Reaction

Chapter: Haloalkanes

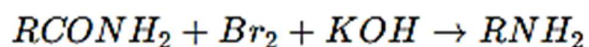
Reaction



16. Hoffmann Bromamide Reaction

Chapter: Amines

Reaction



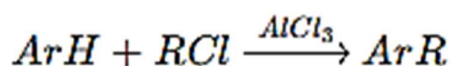
Key Feature

- One carbon less amine formed

17. Friedel–Crafts Alkylation

Chapter: Haloarenes

Reaction



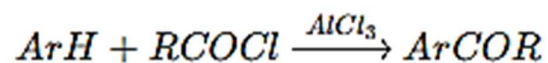
Mechanism

- Carbocation formation
- Electrophilic aromatic substitution

18. Friedel–Crafts Acylation

Chapter: Haloarenes

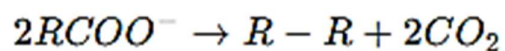
Reaction



19. Kolbe Electrolysis

Chapter: Electrochemistry / Organic

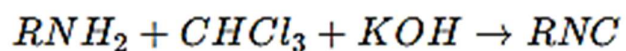
Reaction



20. Carbylamine Reaction

Chapter: Amines

Reaction



Test for

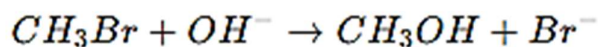
- Primary amines only

COMPLETE REACTION MECHANISMS

1. SN2 MECHANISM (Bimolecular Nucleophilic Substitution)

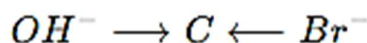
Chapter: Haloalkanes & Haloarenes

Example



Mechanism (Single Step)

- Nucleophile attacks from the back
- C-Br bond breaks simultaneously

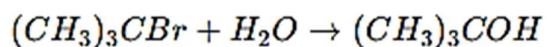


- ✓ Inversion of configuration (Walden inversion)
- ✓ Favoured by primary halides

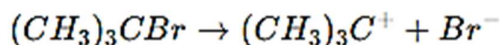
2. SN1 MECHANISM (Unimolecular Nucleophilic Substitution)

Chapter: Haloalkanes

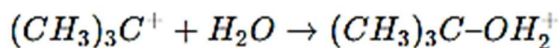
Example



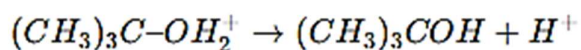
Step-1: Ionisation (Slow, RDS)



Step-2: Nucleophilic Attack



Step-3: Deprotonation

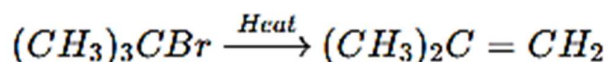


- ✓ Carbocation formation
- ✓ Favoured by tertiary halides

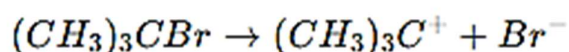
3. E1 MECHANISM (Elimination)

Chapter: Haloalkanes

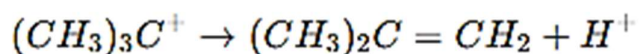
Example



Step-1: Carbocation Formation



Step-2: Proton Loss



✓ Zaitsev's rule followed

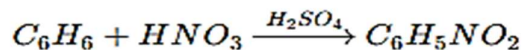
4. Electrophilic Aromatic Substitution (EAS)

Chapter: Alcohols, Phenols, Haloarenes

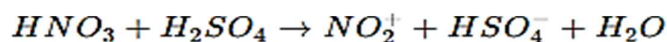
General Steps

1. Generation of electrophile
2. Formation of σ -complex
3. Deprotonation

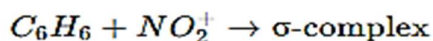
Example: Nitration of Benzene



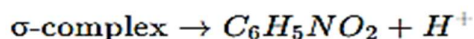
Step-1: Electrophile Formation



Step-2: σ -Complex Formation



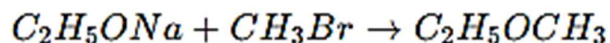
Step-3: Deprotonation



5. Williamson Ether Synthesis (SN2)

Chapter: Alcohols & Ethers

Example



Mechanism

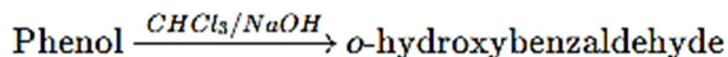
- Alkoxide ion attacks alkyl halide (SN2)
- Backside attack

✓ Primary halide compulsory

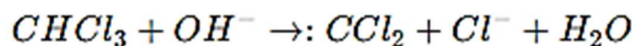
6. Reimer-Tiemann Reaction

Chapter: Phenols

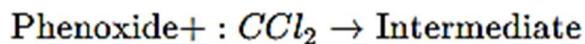
Example



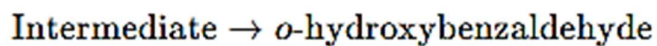
Step-1: Carbene Formation



Step-2: Electrophilic Attack



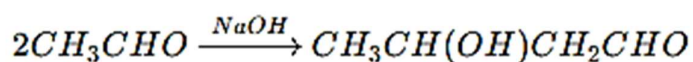
Step-3: Hydrolysis



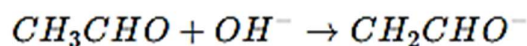
7. Aldol Condensation

Chapter: Aldehydes & Ketones

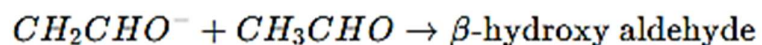
Example



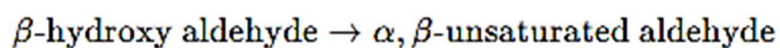
Step-1: Enolate Formation



Step-2: Nucleophilic Addition



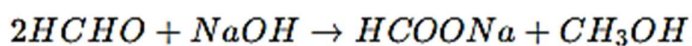
Step-3: Dehydration



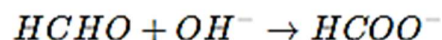
8. Cannizzaro Reaction

Chapter: Aldehydes (No α -H)

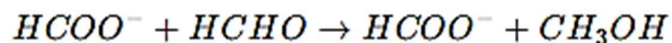
Example



Step-1: Nucleophilic Attack



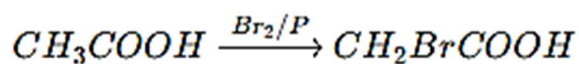
Step-2: Hydride Transfer



9. HVZ Reaction

Chapter: Carboxylic Acids

Example



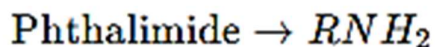
Steps

1. Formation of acyl bromide
2. α -Bromination
3. Hydrolysis

10. Gabriel Phthalimide Synthesis

Chapter: Amines

Example



Steps

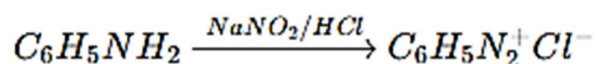
1. Formation of potassium salt
2. SN_2 substitution
3. Hydrolysis

✓ Gives primary amines only

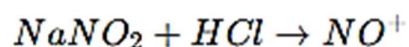
11. Diazotisation Reaction

Chapter: Amines

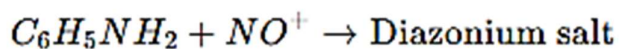
Example



Step-1: Nitrosyl Cation Formation



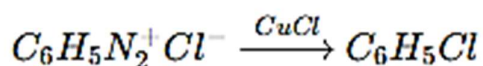
Step-2: Attack on Amine



12. Sandmeyer Reaction

Chapter: Amines

Example



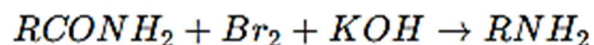
Mechanism

- Loss of N_2
- Radical substitution

13. Hoffmann Bromamide Reaction

Chapter: Amines

Example



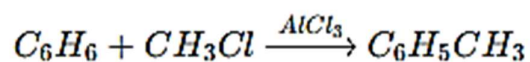
Key Feature

- Carbon chain reduces by one

14. Friedel–Crafts Alkylation

Chapter: Haloarenes

Example



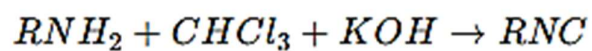
Mechanism

1. Carbocation formation
2. EAS
3. Deprotonation

15. Carbylamine Reaction

Chapter: Amines

Example



✓ Test for primary amines