Funny Tricks for Named Reactions

नामित अभिक्रियाओं की मज़ेदार ट्रिक्स — Class 12 Chemistry · Units 6–9

How it works / कैसे काम करता है: every reaction gets a 💡 **catchphrase** (say it aloud 3 times), a 📖 **funny story** to picture, the **reaction from your NCERT book**, and ✍️ **what to write in the exam**. Stars ★★★ = highest exam priority.
हर अभिक्रिया के लिए: 💡 ज़ोर से बोलने वाला वाक्य, 📖 मज़ेदार कहानी (आँखें बंद करके सोचो), NCERT की अभिक्रिया, और ✍️ परीक्षा में क्या लिखें।

Super-trick — the 5 "confusing couples" 👫:
Reimer ($CHCl_3$ → **CHO**) vs Kolbe (CO_2 → **COOH**) · Aldol (α-H, **dilute**) vs Cannizzaro (no α-H, **conc.**) · Clemmensen (**lemon = acid**) vs Wolff-Kishner (**wild = base**) · Sandmeyer (**salt**) vs Gatterman (**powder**) · Finkelstein (**I**) vs Swarts (**F**)

Unit 6 — Haloalkanes & Haloarenes (हैलोऐल्केन एवं हैलोऐरीन)

1 Finkelstein Reaction ★★

💡 **Finkel-STEIN = Find-I in acetone**

📖 Mr. Finkelstein goes to an **acetone party** wearing **NaI**. Cl and Br try to dance with him but they get kicked out and **fall to the floor as NaCl/NaBr precipitate**. The party now belongs to **Iodine**! Since the losers left the room, nobody can come back — reaction goes forward (Le Chatelier).
फ़िंकेलस्टाइन जी शुष्क ऐसीटोन की पार्टी में NaI पहनकर आए; Cl/Br नीचे गिरकर (अवक्षेप) बाहर — पार्टी अब आयोडीन की!

$$R\text{–}X + NaI \longrightarrow R\text{–}I + NaX$$

X=Cl, Br

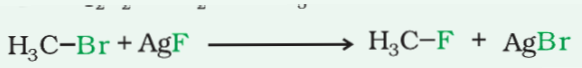
✍️ **Write in exam:** R–Cl / R–Br + NaI → R–I · dry acetone · NaCl/NaBr precipitates

2 Swarts Reaction ★★

💡 Swarts = Sweet Fluoride (AgF, Hg_2F_2, CoF_2, SbF_3)

📖 Swarts is a **fluoride toothpaste salesman**. He swaps the halide's old teeth (Cl/Br) with shiny **F** teeth using metal tubes — **Ag, Hg, Co, Sb**. Remember the tubes as "**A**aj **H**amne **C**olgate **S**aaf kiya" (Ag, Hg, Co, Sb).

स्वार्ट्स = फ़्लुओराइड टूथपेस्ट वाला; धातु फ़्लुओराइड (Ag, Hg, Co, Sb) से Cl/Br हटाकर F लगाता है। फ़्रियॉन भी इसी से बनता है।



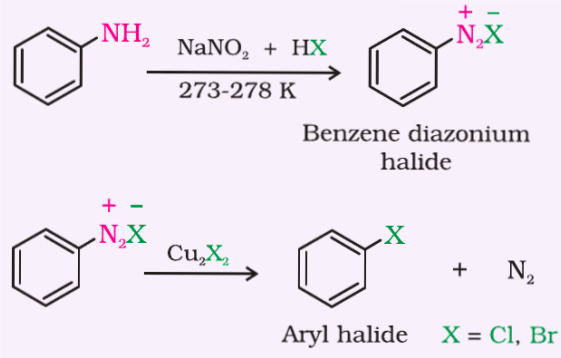
✍️ **Write in exam:** R–Cl/Br + AgF → R–F · also makes Freon-12 from CCl_4

3 Sandmeyer Reaction ★★★

💡 Sandmeyer = Salt of Cu(I) — 'Sand mein Copper ka namak'

📖 Diazonium is a **nervous bride** with N_2 in her bag. **Uncle Cu(I)** (Cu_2Cl_2 / Cu_2Br_2 / CuCN) arrives with a gift — Cl, Br or CN. The bride happily drops N_2 (it flies away as gas 🎈) and takes the gift. Uncle Cu(I) brings **salt**, not powder!

डाइऐज़ोनियम दुल्हन N_2 छोड़ देती है और Cu(I) चाचा का तोहफ़ा (Cl, Br, CN) ले लेती है।



✍️ **Write in exam:** $ArN_2^+X^-$ + Cu_2X_2 → ArX + N_2 · gives Cl, Br, CN · better yield than Gatterman

4 Wurtz Reaction ★★★

💡 Wurtz = 'Wah! Double!' — R + R

📖 Two lonely alkyl halides meet at a **Sodium (Na) shaadi** in a **dry ether hall** (no water allowed — strict uncle!). Na takes away both X's as gifts (NaX) and the two R's get **married** → **R–R**. Carbons **double**! Ethyl + ethyl → butane.

दो ऐल्किल हैलाइड की Na शादी (शुष्क ईथर में) — X गिफ़्ट में गया, R–R जोड़ी बनी; कार्बन दोगुने।

$$2RX + 2Na \longrightarrow RR + 2NaX$$

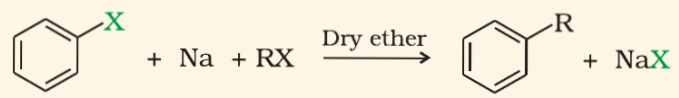
✍️ **Write in exam:** 2RX + 2Na → R–R + 2NaX · dry ether

5 Wurtz–Fittig Reaction ★★

💡 Wurtz (alkyl) + Fittig (aryl) = Love marriage — R weds Ar

📖 Same Na wedding hall, but this time it's an **inter-caste marriage**: an **alkyl** boy (Wurtz family) marries an **aryl** girl (Fittig family). Result: **alkylbenzene** (toluene from $CH_3Br + C_6H_5Br$).

वुट्ज़-फ़िटिग = ऐल्किल + ऐरिल की प्रेम विवाह; उत्पाद ऐल्किलबेंज़ीन।



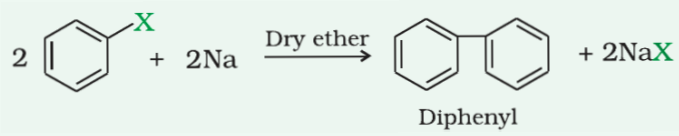
✍️ **Write in exam:** ArX + RX + 2Na → Ar–R · dry ether

6 Fittig Reaction ★★

💡 Fittig = 'Fit' rings — two benzene rings fit together

📖 Two **gym-going benzene rings** (aryl halides) hold hands with Na's help and become best friends — **Diphenyl** (biphenyl). Only rings, no alkyl allowed in this gym!

फ़िटिग = दो बेंज़ीन वलय जिम में मिले, Na की मदद से जुड़े — डाइफ़ेनिल।



✍️ **Write in exam:** 2ArX + 2Na → Ar–Ar (diphenyl) · dry ether

7 Grignard Reagent ★★

💡 Grignard = 'Gr-Mg' — Paani se Dushmani

📖 Grignard reagent is like a **cat** 🐱: made by Mg in **dry ether** and **HATES water**. Even a drop of water, alcohol or amine and it immediately turns into a boring hydrocarbon (RH). So always keep it **dry**!

ग्रिन्यार बिल्ली जैसा — पानी से नफ़रत! एक बूँद पानी मिला तो RH बन जाता है, इसलिए शुष्क ईथर।

$$CH_3CH_2Br + Mg \xrightarrow{\text{dry ether}} \underset{\text{Grignard reagent}}{CH_3CH_2MgBr}$$

$$RMgX + H_2O \longrightarrow RH + Mg(OH)X$$

✍️ **Write in exam:** RX + Mg → RMgX (dry ether) · RMgX + H_2O → RH + Mg(OH)X

8 Zaitsev (Saytzeff) Rule — Dehydrohalogenation ★★

💡 Alcoholic KOH = Alkene banao; 'Zyada substituted = Zaitsev ka favourite'

📖 **Alcoholic KOH** is a party animal 🥳 — it doesn't substitute, it **eliminates** (kicks out H and X) to make an alkene. Zaitsev, the snobbish judge, always chooses the alkene with **more alkyl groups on the double bond** (the richer one): pent-**2**-ene 81% wins over pent-1-ene. Aqueous KOH = good boy → substitution (alcohol).

ऐल्कोहॉली KOH = विलोपन (ऐल्कीन); जलीय KOH = प्रतिस्थापन। ज़ैतसेव अधिक प्रतिस्थापित ऐल्कीन चुनता है।

$$\underset{\text{Pent-2-ene (81\%)}}{H_3C{-}CH_2{-}CH{=}CH{-}CH_3} \xleftarrow{\bar{O}H} \underset{\text{2-Bromopentane}}{H_3C{-}CH_2{-}CH_2{-}\overset{\overset{Br}{|}}{CH}{-}\underset{\underset{H}{|}}{CH_2}} \xrightarrow{\bar{O}H} \underset{\text{Pent-1-ene (19\%)}}{H_3C{-}CH_2{-}CH_2{-}CH{=}CH_2}$$

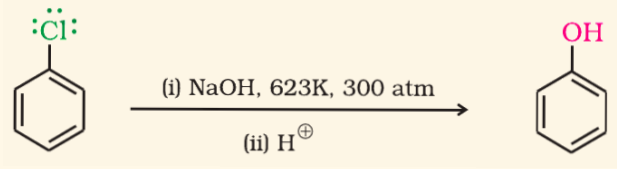
✍️ **Write in exam:** RX + alc. KOH → alkene · more substituted alkene = major

9 Dow's Process (Chlorobenzene → Phenol) ★★

💡 **Chlorobenzene is a lazy guy — needs 623 K and 300 atm to wake up!**

📖 Chlorobenzene is **super lazy** 😴 (C–Cl has partial double bond). To make it react with NaOH you need **623 K + 300 atm** — like a 300-person alarm! But add **nitro groups at o/p** (coffee ☕) and he wakes up faster: 1 NO_2 → 443 K, 2 → 368 K, 3 → just warm water!

क्लोरोबेंज़ीन आलसी — 623 K, 300 atm चाहिए; o/p पर नाइट्रो (कॉफ़ी) मिलाओ तो जल्दी जागता है।



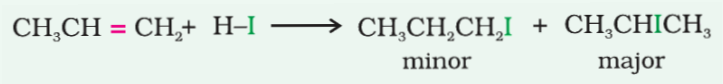
✍️ **Write in exam:** $C_6H_5Cl + NaOH$ (623 K, 300 atm) → C_6H_5ONa → H^+ → C_6H_5OH

10 Markovnikov's Rule (Addition of HX) ★

💡 **'Ameer aur ameer hota hai' — H goes to the richer carbon**

📖 When HX adds to an unsymmetrical alkene, **H** goes to the carbon that **already has more H** (rich gets richer 💰), and **X** goes to the poorer carbon. Propene + HI → **2-iodopropane** (major).

अमीर और अमीर होता है — H उस कार्बन पर जिस पर पहले से अधिक H हैं।



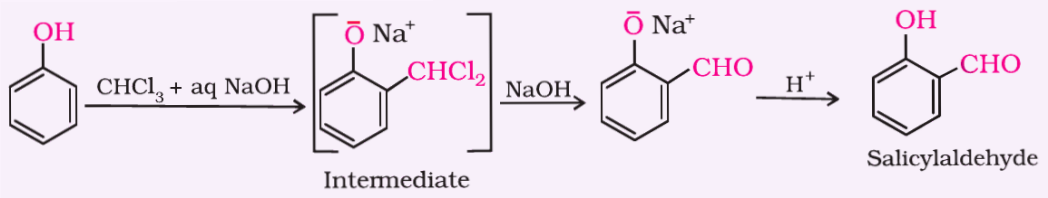
✍️ **Write in exam:** $CH_3CH=CH_2 + HI \rightarrow CH_3CHICH_3$ (major)

Unit 7 — Alcohols, Phenols & Ethers (ऐल्कोहॉल, फ़ीनॉल एवं ईथर)

11 Reimer–Tiemann Reaction ★★★

💡 Reimer = $CHCl_3$ → CHO (CH stays CH!)

📖 Phenol orders **CHloroform** online with **NaOH** cash-on-delivery 📦. The delivery boy drops the parcel at the **ortho** door (next door). Open the box: the **Cl_3** packaging is thrown away and inside is a **CHO — salicylaldehyde**!
Remember: **$CHCl_3$ → CHO**.
फ़ीनॉल ने $CHCl_3$ ऑनलाइन मँगाया (NaOH कैश), ऑर्थो दरवाज़े पर पार्सल, खोला तो CHO — सैलिसिलऐल्डिहाइड!

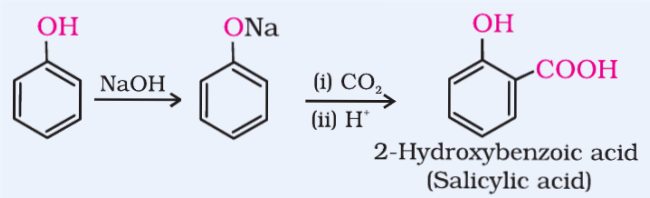


✍️ **Write in exam:** Phenol + $CHCl_3$ + aq. NaOH → H^+ → salicylaldehyde (o-CHO)

12 Kolbe's Reaction ★★★

💡 Kolbe = CO_2 → COOH (K–C–C)

📖 Sodium phenoxide is **hungry** and very reactive. It even eats **CO_2** — a weak electrophile — like a **cola** 🥤 (Kol-be = Cola-be!). The CO_2 sits at the **ortho** position and becomes **–COOH** → **salicylic acid** (used to make aspirin).
कोल्बे = कोला पीने वाला — फ़ीनॉक्साइड CO_2 पीकर ऑर्थो पर –COOH बनाता है (सैलिसिलिक अम्ल)।



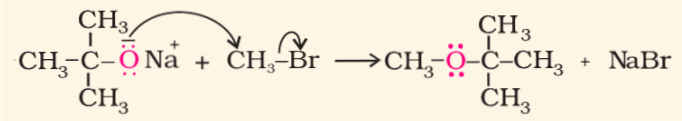
✍️ **Write in exam:** C_6H_5ONa + CO_2 → H^+ → o-hydroxybenzoic (salicylic) acid

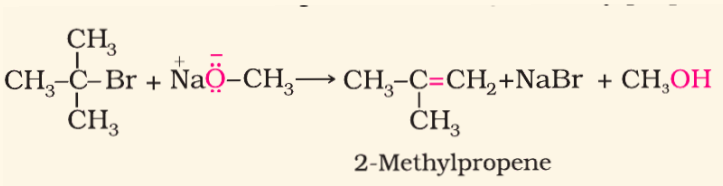
13 Williamson Ether Synthesis ★★★

💡 Williamson: 'Bhaari bhai alkoxide mein, halide hamesha halka (1°)'

📖 Williamson runs a **matchmaking agency** for ethers 💍. Rule: the **alkoxide** can be fat (bulky, 3°), but the **alkyl halide must be slim (1°)**. If the halide is 3° (fat), the alkoxide — who is also a strong base — gets angry, pulls out an H and you get an **alkene** instead of a wedding (elimination)! For aryl ethers, the **phenoxide** must be the alkoxide partner.

विलियम्सन की रिश्ता एजेंसी: एल्कॉक्साइड मोटा चल सकता है, पर हैलाइड पतला (1°) होना चाहिए; वरना ऐल्कीन बनती है।





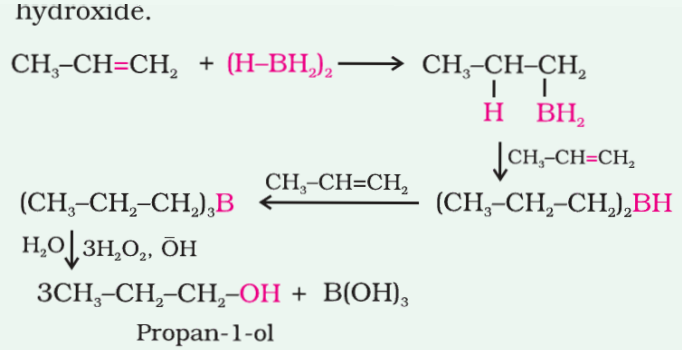
✍️ **Write in exam:** R–X (1°) + R'–ONa → R–O–R' + NaX (S_N2) · 3° halide → only alkene

14 Hydroboration–Oxidation ★★

💡 Boron = 'Bholu', avoids the crowd → OH lands on less crowded carbon

📖 **Bholu Boron** is shy and hates crowds 🙈. He always sits on the carbon with **more H** (less crowded). Later H_2O_2/OH^- replaces him with OH — so OH ends up on the **terminal** carbon. Looks like **anti-Markovnikov**! Propene → **propan-1-ol**.

भोला बोरॉन भीड़ से डरता है — कम भीड़ वाले कार्बन पर बैठता है; वहीं OH आता है (मार्कोनीकॉफ़-विरोधी)।



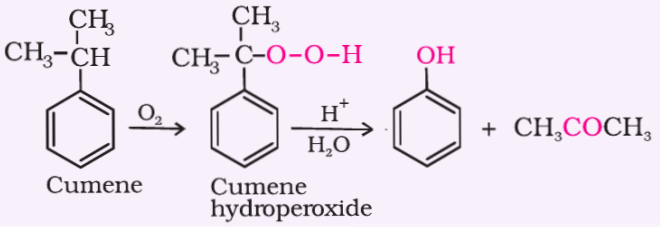
✍️ **Write in exam:** $(BH_3)_2$; H_2O_2/OH^- · propene → propan-1-ol

15 Cumene Process ★★

💡 **'Cumene ke do bachche — Phenol aur Acetone'**

📖 *Mrs. **Cumene** breathes fresh **air (O_2)** and becomes **cumene hydroperoxide**. Then she drinks a little **dilute acid** and gives birth to **twins** 👶👶 — **Phenol and Acetone**. Most of the world's phenol comes from her!*

क्यूमीन बहन ने हवा ली, फिर तनु अम्ल पिया और जुड़वाँ बच्चे — फ़ीनॉल और ऐसीटोन!



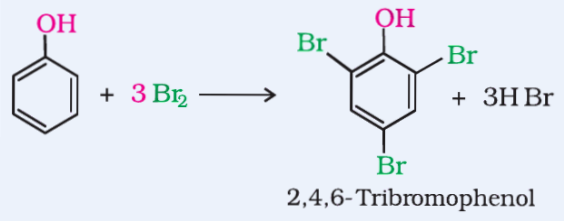
✍️ **Write in exam:** *Cumene + O_2 → cumene hydroperoxide → H^+/H_2O → phenol + acetone*

16 Lucas Test ★★

💡 **'Teen Turant, Do Der se, Ek Ekdum Nahi'**

📖 *Lucas reagent (conc. HCl + $ZnCl_2$) is a **teacher taking attendance** 👩‍🏫. The **3°** alcohol is the topper — becomes cloudy (turbid) **immediately**. The **2°** one comes **after ~5 minutes**. The **1°** one is absent — **no turbidity** at room temperature.*

ल्यूकस टीचर की हाज़िरी: तृतीयक तुरंत, द्वितीयक 5 मिनट बाद, प्राथमिक गैरहाज़िर।



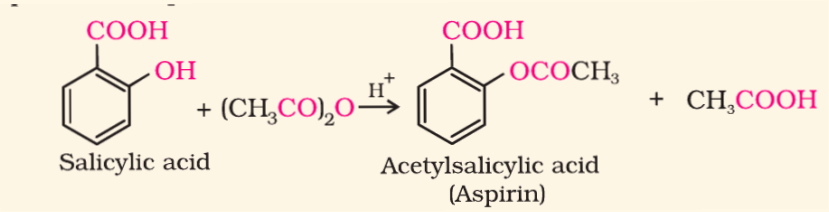
✍️ **Write in exam:** *Lucas reagent = conc. HCl + anhyd. $ZnCl_2$ · turbidity = alkyl chloride*

17 Esterification / Acetylation (Aspirin) ★★

💡 **'Acetyl ka topi pehnao → Aspirin ban jao'**

📖 *Salicylic acid has a **headache** 🤕. Acetic anhydride puts an **acetyl cap** (CH_3CO-) on its –OH. Now it becomes **Aspirin** — and cures everyone's headache! With acid chlorides, **pyridine** is the sponge that soaks up HCl.*

सैलिसिलिक अम्ल को सिरदर्द — ऐसीटिल टोपी पहनाई, ऐस्पिरिन बन गया!



✍️ **Write in exam:** *Salicylic acid + $(CH_3CO)_2O$ → aspirin · pyridine removes HCl*

18 Ether Cleavage by HI ★★

💡 **'Chhota Iodide, Bada Alcohol' · 'Phenol kabhi halide nahi banta'**

📖 *HI is a **bouncer** 🕴 who breaks up the ether couple. He grabs the **smaller** (less hindered) partner and makes it the iodide; the bigger one leaves as alcohol (S_N2). Exception: if one partner is a **3° bodybuilder**, it forms a stable carbocation and becomes the **3° iodide** (S_N1). In anisole, the **phenyl stays with O** (phenol) — aryl never becomes a halide!*

HI बाउंसर: छोटा समूह आयोडाइड बनता है, बड़ा ऐल्कोहॉल; तृतीयक हो तो वही आयोडाइड; फ़ीनॉल कभी हैलाइड नहीं।



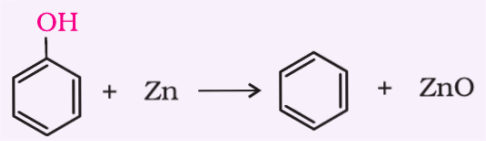
✍️ **Write in exam:** *$CH_3OC_2H_5 + HI \rightarrow CH_3I + C_2H_5OH$ · $C_6H_5OCH_3 + HI \rightarrow C_6H_5OH + CH_3I$*

19 Phenol + Zinc Dust ★

💡 **'Zinc Zaps the OH'**

📖 Zinc dust is a **thief** 🦹 — it steals phenol's oxygen and runs away as ZnO, leaving plain **benzene**.

ज़िंक चोर — फ़ीनॉल का O चुराकर ZnO बना, बचा बेंज़ीन।



✍️ **Write in exam:** $C_6H_5OH + Zn \rightarrow C_6H_6 + ZnO$

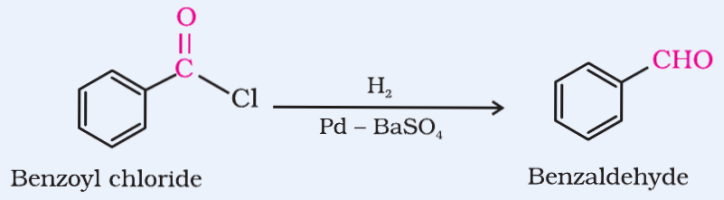
Unit 8 — Aldehydes, Ketones & Carboxylic Acids (ऐल्डिहाइड, कीटोन एवं अम्ल)

20 Rosenmund Reduction ★★★

💡 **'Rose in a Bas(ket)' — Pd on $BaSO_4$**

📖 Acid chloride wants to become an aldehyde, but H_2 is **too strong** — he would go all the way to alcohol! So we give Pd a **$BaSO_4$ basket** 🌹🧺 (poisoned catalyst) to slow him down. Result: stops nicely at **aldehyde**.

रोज़ेनमुंड = गुलाब की टोकरी ($BaSO_4$) में Pd — उत्प्रेरक धीमा, ऐल्डिहाइड पर रुकता है।



✍️ **Write in exam:** $RCOCl + H_2 \rightarrow (Pd\text{–}BaSO_4) \rightarrow RCHO + HCl$

21 Stephen Reaction ★★

'STephen = $SnCl_2$' (S–S)

Stephen is a **tin-man** 🤖 **(Sn)**. He takes a **nitrile**, gives it $SnCl_2$ + HCl to make an **imine**, then a water bath (hydrolysis) → **aldehyde**. N goes away as NH_3/NH_4Cl.

स्टीफ़न = टिन मैन ($SnCl_2$): नाइट्राइल → इमीन → जल-अपघटन → ऐल्डिहाइड।

$$RCN + SnCl_2 + HCl \longrightarrow RCH=NH \xrightarrow{H_3\overset{+}{O}} RCHO$$

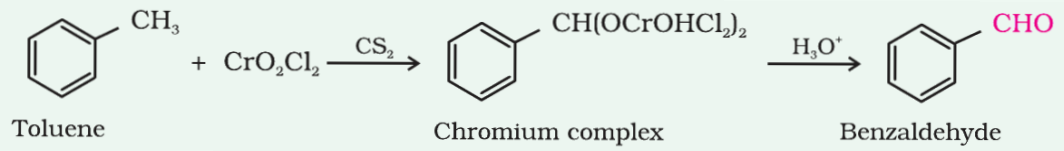
✍ **Write in exam:** RCN + $SnCl_2$/HCl → RCH=NH → H_3O^+ → RCHO

22 Etard Reaction ★★★

'Etard = Easy Toluene + chromyl' — CrO_2Cl_2

Toluene goes to **Etard's beauty parlour** 💇. The beautician **Chromyl Chloride (CrO_2Cl_2)** wraps the CH_3 in a chromium complex (face-pack), then washes with water → **Benzaldehyde**, shining! (Without this, toluene would over-oxidise to benzoic acid.)

टॉलूईन एटार्ड के ब्यूटी पार्लर में — क्रोमिल क्लोराइड का फ़ेस-पैक, धोया तो बेंज़ैल्डिहाइड!



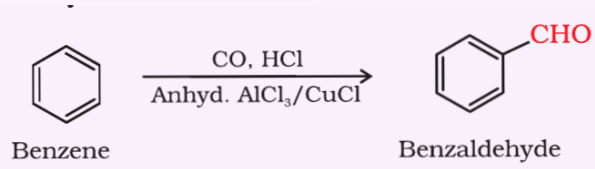
✍ **Write in exam:** $C_6H_5CH_3$ + CrO_2Cl_2 (CS_2) → complex → H_3O^+ → C_6H_5CHO

23 Gatterman–Koch Reaction ★★★

'Koch = CO' — Benzene drinks CO + HCl

Benzene goes to a **Coke (Koch!) party** 🥤: drinks **CO + HCl** with friends **$AlCl_3$/CuCl** and becomes **Benzaldehyde**. Don't confuse with Gatterman (diazonium + Cu powder) — 'Koch' means CO!

गाटरमान-कोख = कोक पार्टी: बेंज़ीन ने CO + HCl पिया → बेंज़ैल्डिहाइड।



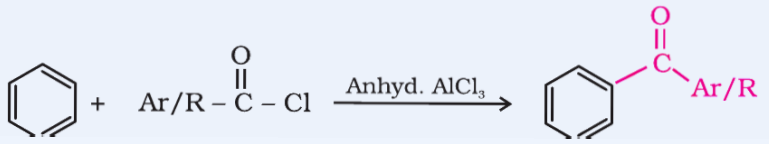
✍ **Write in exam:** C_6H_6 + CO + HCl → (anhyd. $AlCl_3$/CuCl) → C_6H_5CHO

24 Friedel–Crafts Acylation ★★

💡 **'Friedel–Crafts = Free $AlCl_3$ craft class' — benzene gets an acyl hat**

📖 *Benzene joins a **free craft class** 🎨 taught by **Anhydrous $AlCl_3$**. It makes an **acyl hat (RCO–)** from an acid chloride and wears it → **aryl ketone** (acetophenone from CH_3COCl).*

फ़्रीडेल-क्राफ़्ट्स = $AlCl_3$ की क्राफ़्ट क्लास; बेंज़ीन ने ऐसिल टोपी पहनी → कीटोन।



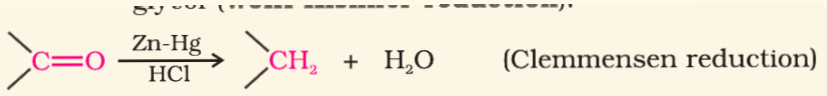
✍️ **Write in exam:** $C_6H_6 + RCOCl \xrightarrow{(anhyd.\ AlCl_3)} C_6H_5COR + HCl$

25 Clemmensen Reduction ★★★

💡 **'Clemmensen = Clay (Zn-Hg) + Chloride (HCl)' → ACIDIC**

📖 *Clemmensen is a **sour lemon** 🍋 **(acidic)** guy. He uses **Zinc amalgam + conc. HCl** and squeezes the oxygen out of C=O, leaving just **CH_2**. Clemmensen = **C=O** → **CH_2** in **C**oncentrated HCl.*

क्लेमेंसन = खट्टा नींबू (अम्लीय): Zn-Hg + सान्द्र HCl से C=O → CH_2।



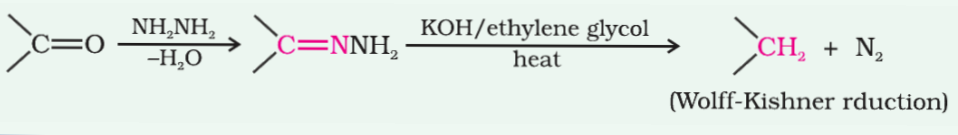
✍️ **Write in exam:** $>C=O \xrightarrow{(Zn\text{-}Hg\ /\ conc.\ HCl)} >CH_2$

26 Wolff–Kishner Reduction ★★★

💡 **'Wolff = Wild & Basic' — Hydrazine + KOH**

📖 *The **Wolf** 🐺 is wild and **basic** — he hates acids. He uses **hydrazine (NH_2NH_2)** then **KOH in ethylene glycol** with heat to remove the O from C=O → **CH_2**. Same result as Clemmensen, opposite mood!*

भेड़िया (वुल्फ़) जंगली और क्षारीय — हाइड्रेज़ीन + KOH से C=O → CH_2।



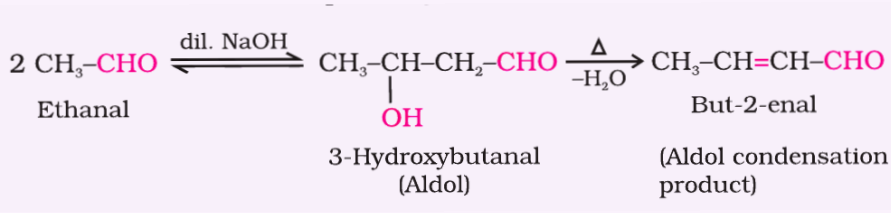
✍️ **Write in exam:** $>C=O \xrightarrow{NH_2NH_2} \xrightarrow{KOH/ethylene\ glycol,\ \Delta} >CH_2$

27 Aldol Condensation ★★★

💡 **'ALD + OL = ALDOL' · 'Alpha-H hai to Aldol' · DILUTE base**

📖 *Two aldehydes with **α-H** (pocket money 💵) meet in **dilute NaOH**. One gives its α-H money, they join → **β-hydroxy aldehyde** = **ALD**ehyde + alcoh**OL**. Heat them and they lose water 💧 → **α,β-unsaturated aldehyde** (but-2-enal). No α-H = no aldol!*

α-H वाले ऐल्डिहाइड तनु NaOH में मिलकर ऐल्डोल (ऐल्डिहाइड + ऐल्कोहॉल) बनाते हैं; गरम करने पर जल निकलता है।



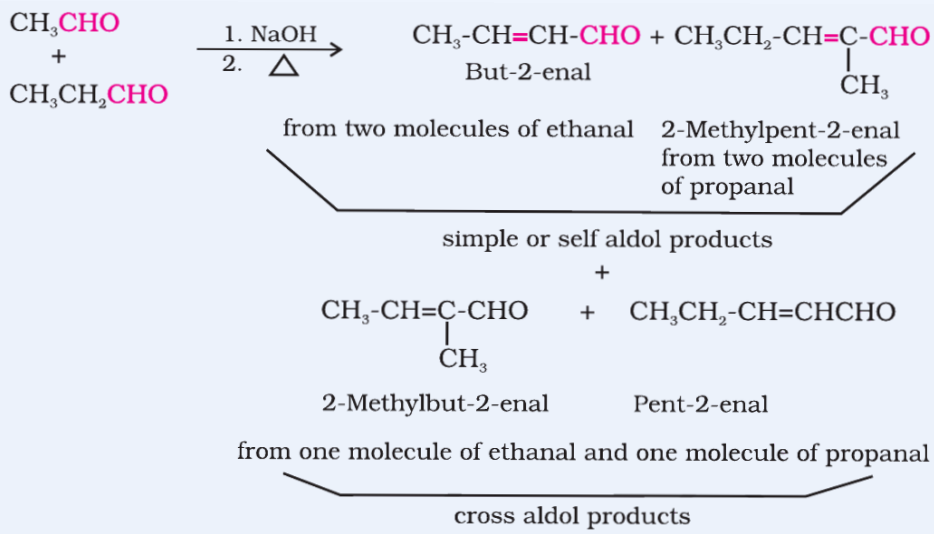
✍️ **Write in exam:** $2CH_3CHO \rightarrow$ (dil. NaOH) $\rightarrow CH_3CH(OH)CH_2CHO \rightarrow \Delta \rightarrow CH_3CH{=}CHCHO$

28 Cross Aldol Condensation ★★★

💡 **'Two families, four children' — 2 self + 2 cross**

📖 *Ethanal and propanal (both with α-H) go to the **same dilute-NaOH party**. Everyone dances with everyone 💃🕺 → **4 products**: 2 self-aldols + 2 cross-aldols. Messy party!*

दो परिवार (दोनों में α-H) — चार बच्चे: 2 स्वयं + 2 क्रॉस उत्पाद।



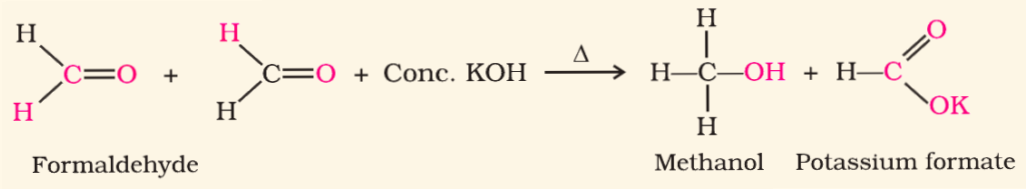
✍️ **Write in exam:** *Ethanal + propanal → 4 aldol products*

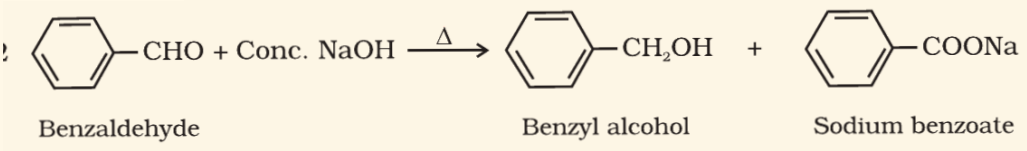
29 Cannizzaro Reaction ★★★

💡 **'No α-H + Conc. base = Cannizzaro' · 'Do bhai — ek upar, ek neeche'**

📖 Two **poor aldehyde brothers** with **no α-H** (no pocket money) fall into **concentrated alkali**. They can't do aldol, so they **share fate**: one brother goes **down (reduced)** → alcohol 😇, the other goes **up (oxidised)** → acid salt 😈. This is **disproportionation**. Stars: $HCHO$, C_6H_5CHO.

α-H रहित दो गरीब भाई सान्द्र क्षार में — एक नीचे (ऐल्कोहॉल), एक ऊपर (अम्ल लवण): असमानुपातन।





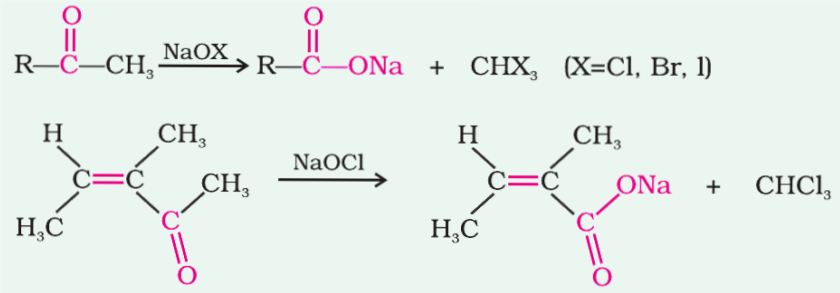
✍️ **Write in exam:** $2HCHO + conc.\ KOH \rightarrow CH_3OH + HCOOK$ · $2C_6H_5CHO \rightarrow C_6H_5CH_2OH + C_6H_5COONa$

30 Haloform / Iodoform Reaction ★★★

💡 **'CH_3–CO ho ya CH_3–CH(OH) — dono Peela karte hain'**

📖 Iodine + NaOH is a **yellow paint gun** 🟡. Any molecule with a **CH_3CO–** (methyl ketone) or **$CH_3CH(OH)$–** tag gets shot and leaves behind a **yellow ppt of CHI_3** (antiseptic smell). Ethanol and ethanal = YES; methanol = NO.

आयोडीन + NaOH = पीली पेंट गन; CH_3CO– या $CH_3CH(OH)$– वाले को पीला आयोडोफ़ॉर्म।



✍️ **Write in exam:** $RCOCH_3 + NaOI \rightarrow RCOONa + CHI_3\downarrow$ (yellow)

31 Hell–Volhard–Zelinsky (HVZ) ★★★

💡 **'Hell mein Laal aag — Alpha pe Halogen'**

📖 In **Hell** 🔥, the devil uses **Red Phosphorus** (red fire) and **Cl_2/Br_2** to brand the carboxylic acid on its **α-carbon** (the neck right next to COOH). Result: **α-halo acid**. No α-H = can't enter Hell!

HVZ = नरक की लाल आग (लाल P) + हैलोजन → α-कार्बन पर ठप्पा (α-हैलो अम्ल)।

$$R\text{-}CH_2\text{-}COOH \xrightarrow[(ii)\ H_2O]{(i)\ X_2/\text{Red phosphorus}} R\text{-}\underset{\displaystyle X}{\underset{|}{CH}}\text{-}COOH$$

X = Cl, Br

α – Halocarboxylic acid

✍️ **Write in exam:** $RCH_2COOH + X_2$ / red P → H_2O → $RCH(X)COOH$

32 Decarboxylation ★★

💡 **'Sodalime = Subtract one Carbon'**

📖 Sodium salt of an acid goes on a **diet** 🥗 **with sodalime** (NaOH : CaO = 3 : 1) and heat. It loses its **CO_2 belly** and becomes slimmer — an alkane with **one carbon less**.

सोडा-लाइम डाइट — CO_2 पेट गया, एक कार्बन कम वाला ऐल्केन।

$$R\text{-}COONa \xrightarrow[\text{Heat}]{\text{NaOH \& CaO}} R\text{-}H + Na_2CO_3$$

✍️ **Write in exam:** $RCOONa + NaOH\ (CaO), \Delta \rightarrow R\text{-}H + Na_2CO_3$

33 Tollens' Test ★★

💡 **'Tollens = Talwar ki chamak' — Silver mirror**

📖 Aldehyde visits **Tollens' mirror shop** 🪞 (ammoniacal $AgNO_3$) and warms it — a **shining silver mirror** forms on the tube. Ketones look but no mirror forms! (Works for aromatic aldehydes too.)

टॉलेंस = चाँदी का दर्पण; ऐल्डिहाइड हाँ, कीटोन नहीं।

$$RCHO + 2[Ag(NH_3)_2]^+ + 3\ \bar{O}H \longrightarrow R\bar{C}OO + 2Ag + 2H_2O + 4NH_3$$

✍️ **Write in exam:** $RCHO + 2[Ag(NH_3)_2]^+ + 3OH^- \rightarrow RCOO^- + 2Ag\downarrow + 2H_2O + 4NH_3$

34 Fehling's Test ★★

💡 **'Fehling = Fire-red' · 'Benzaldehyde Fehling mein Fail'**

📖 Fehling A (blue $CuSO_4$) + Fehling B (Rochelle salt) make a **blue drink**. Aliphatic aldehyde heats it → **red-brown Cu_2O ppt** 🔴. **Aromatic aldehydes FAIL** this exam!

फ़ेहलिंग = लाल रंग; बेंज़ैल्डिहाइड फ़ेहलिंग में फ़ेल।

$$R\text{-}CHO + 2Cu^{2+} + 5\bar{O}H \longrightarrow R\bar{C}OO + Cu_2O + 3H_2O$$

Red-brown ppt

✍️ **Write in exam:** $RCHO + 2Cu^{2+} + 5OH^- \rightarrow RCOO^- + Cu_2O\downarrow$ (red-brown) $+ 3H_2O$

Unit 9 — Amines (ऐमीन)

35 Hoffmann Bromamide Degradation ★★★

💡 **'Hoffmann = Hatao ek Carbon' · Br_2 + NaOH = 'BN'**

📖 Amide joins **Hoffmann's weight-loss camp** 🏃. Trainer **Br_2** and **NaOH** make it sweat out a **C=O (as CO_2/Na_2CO_3)**. It comes out as an amine with **one carbon less**. Benzamide (7C) → aniline (6C).

हॉफ़मान का वज़न घटाओ कैंप — Br_2 + NaOH से एक कार्बन कम, ऐमीन बनी।

$$R-\overset{\overset{O}{\|}}{C}-NH_2 + Br_2 + 4NaOH \longrightarrow R-NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$$

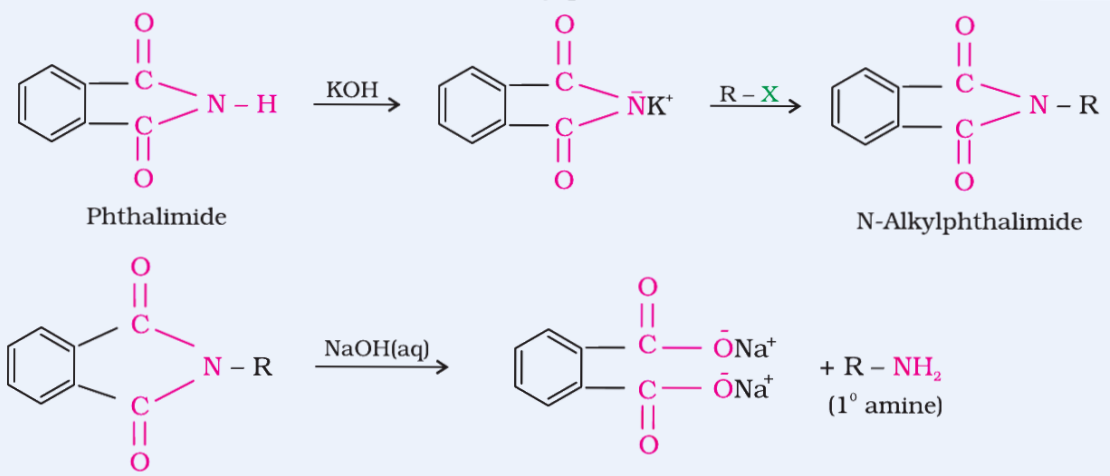
✍️ **Write in exam:** $RCONH_2 + Br_2 + 4NaOH \rightarrow RNH_2 + Na_2CO_3 + 2NaBr + 2H_2O$

36 Gabriel Phthalimide Synthesis ★★★

💡 **'Gabriel = Guaranteed Primary, but Gaadi Aromatic pe nahi chalti'**

📖 Angel **Gabriel** 😇 only blesses **pure primary amines** — no 2° or 3° mixtures! Steps: phthalimide + **ethanolic KOH** → K-salt → + **R–X** → N-alkylphthalimide → **NaOH(aq)** → **1° amine**. But Gabriel can't make **aniline** — aryl halides don't do S_N2!

गैब्रिएल फ़रिश्ता = केवल शुद्ध प्राथमिक ऐमीन; ऐरोमैटिक नहीं।



✍️ **Write in exam:** Phthalimide → KOH → R–X → NaOH(aq) → $R–NH_2$ (pure 1°)

37 Carbylamine Reaction (Isocyanide Test) ★★★

💡 **'Pehla (1°) + Chloroform = Badbu!'** 🤢

📖 Only a **1° amine** (with 2 H on N) can do this prank: mix with **$CHCl_3$ + alcoholic KOH**, heat → **isocyanide** with a **horrible smell** 🤢 — the whole class runs out! 2° and 3° amines are innocent (no smell). **Test for 1° amines.**

प्राथमिक ऐमीन + क्लोरोफ़ॉर्म + KOH = बदबू (आइसोसायनाइड) — प्राथमिक ऐमीन का परीक्षण।

$$R{-}NH_2 + CHCl_3 + 3KOH \xrightarrow{\text{Heat}} R{-}NC + 3KCl + 3H_2O$$

✍️ **Write in exam:** $RNH_2 + CHCl_3 + 3KOH \rightarrow R–NC + 3KCl + 3H_2O$

38 Diazotisation ★★★

💡 **'Zero se Paanch degree' (273–278 K) — Ice-cream reaction** 🍦

📖 *Aniline loves **ice-cream**. Give it **$NaNO_2$ + HCl** in an **ice bath (0–5 °C)** and it becomes **benzenediazonium chloride**. Let it warm up and it melts away (decomposes) — so use it **immediately**!*

डाइऐज़ोटीकरण = आइसक्रीम अभिक्रिया, 0–5 °C पर; गरम होते ही पिघल जाता है।

$$C_6H_5NH_2 + NaNO_2 + 2HCl \xrightarrow{273\text{–}278K} C_6H_5\overset{+}{N_2}\overset{-}{Cl} + NaCl + 2H_2O$$

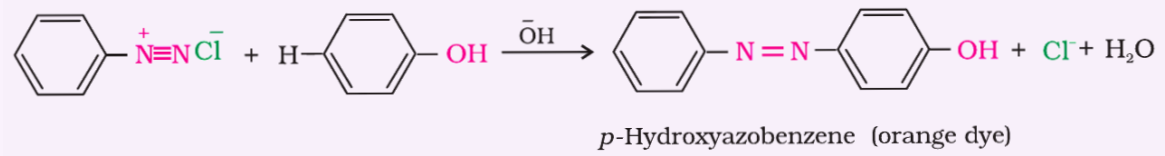
✍️ **Write in exam:** $C_6H_5NH_2 + NaNO_2 + 2HCl \rightarrow (273\text{–}278\ K) \rightarrow C_6H_5N_2^+Cl^- + NaCl + 2H_2O$

39 Coupling Reaction (Azo Dyes) ★★★

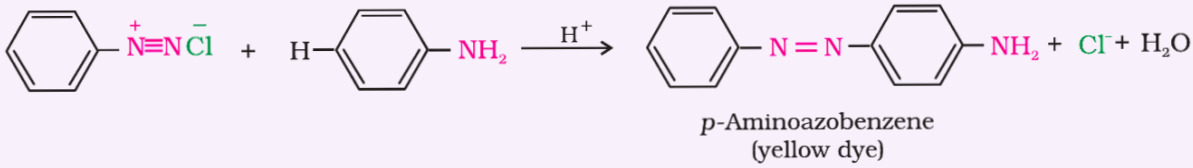
💡 **'Phenol = Orange (Base), Aniline = Yellow (Acid)' — always at Para**

📖 *Diazonium is a **painter** 🎨. It holds hands with phenol or aniline at the **para** position through **–N=N–** (a bridge), making colourful **azo dyes**. Phenol (in **base**) → **orange** p-hydroxyazobenzene 🍊; aniline (in **acid**) → **yellow** p-aminoazobenzene 🍋.*

डाइऐज़ोनियम पेंटर — पैरा पर –N=N– पुल; फ़ीनॉल नारंगी (क्षार), ऐनिलीन पीला (अम्ल)।



p-Hydroxyazobenzene (orange dye)



p-Aminoazobenzene
(yellow dye)

✍️ **Write in exam:** $C_6H_5N_2^+Cl^- + C_6H_5OH\ (OH^-) \rightarrow p\text{-}HO\text{-}C_6H_4\text{-}N{=}N\text{-}C_6H_5$ (orange)

40 Gatterman Reaction ★★★

💡 **'Gatterman = Gold-like Cu powder (metal), only Cl/Br'**

📖 Gatterman is Sandmeyer's **cheaper cousin**: instead of Cu(I) salt he uses **copper powder + HCl/HBr**. Works, but **lower yield** — and he can't bring CN!
Sandmeyer = salt 🧂, Gatterman = powder ✨.
गाटरमान = सैंडमेयर का सस्ता भाई — Cu चूर्ण + HX; लब्धि कम, CN नहीं।

$$ArN_2^+X^- \xrightarrow[Cu/HBr]{Cu/HCl} \begin{matrix} ArCl + N_2 + CuX \\ ArBr + N_2 + CuX \end{matrix}$$

✍️ **Write in exam:** $C_6H_5N_2^+Cl^- + Cu/HCl \rightarrow C_6H_5Cl + N_2$

41 Diazonium: KI, HBF_4, H_3PO_2, H_2O, $NaNO_2$ ★★

💡 **'Reagent mein hi group chhupa hai!' — KI → I, HBF_4 → F, H_3PO_2 → H, H_2O → OH, $NaNO_2$ → NO_2**

📖 Diazonium is a **vending machine** 🎰: put in a reagent, the group **written inside its name** pops out on the ring and N_2 flies away. KI → iodobenzene; HBF_4 then heat → fluorobenzene (Balz–Schiemann); H_3PO_2 or ethanol → benzene; warm water (283 K) → phenol; $NaNO_2$/Cu → nitrobenzene.
डाइऐज़ोनियम वेंडिंग मशीन — अभिकर्मक में जो समूह है, वही वलय पर आता है।

$$ArN_2^+Cl^- + HBF_4 \longrightarrow Ar-N_2^+BF_4^- \xrightarrow{\Delta} Ar-F + BF_3 + N_2$$

$$ArN_2^+Cl^- + H_3PO_2 + H_2O \longrightarrow ArH + N_2 + H_3PO_3 + HCl$$

$$ArN_2^+Cl^- + CH_3CH_2OH \longrightarrow ArH + N_2 + CH_3CHO + HCl$$

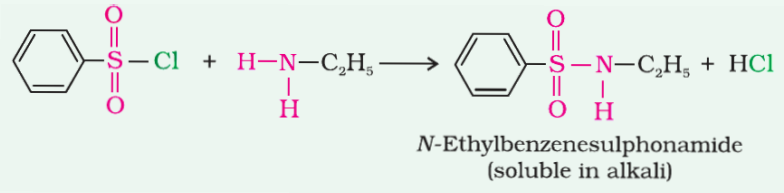
✍️ **Write in exam:** $ArN_2^+ + KI \rightarrow ArI$ · $HBF_4/\Delta \rightarrow ArF$ · $H_3PO_2 \rightarrow ArH$ · $H_2O \rightarrow ArOH$

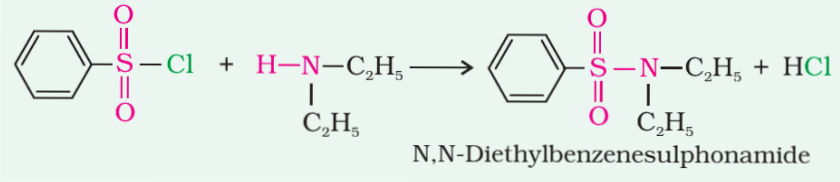
42 Hinsberg Test ★★

💡 '1 Ghulta, 2 Girta, 3 Ghoorta'

📖 Hinsberg reagent ($C_6H_5SO_2Cl$) is a **swimming coach** 🏊. The **1°** amine's product still has an acidic N–H → **dissolves in KOH** (swims). The **2°** one has no N–H → **insoluble, sinks**. The **3°** one just **stares** from the side — no reaction!

हिन्सबर्ग स्विमिंग कोच: 1° घुलता, 2° गिरता (अविलेय), 3° घूरता (अभिक्रिया नहीं)।





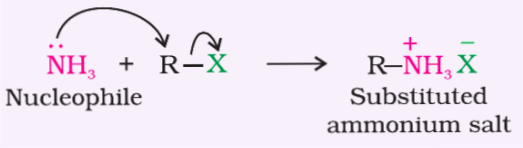
✍️ **Write in exam:** 1° → soluble in alkali · 2° → insoluble · 3° → no reaction

43 Ammonolysis ★★

💡 'Ammonia ki baraat — sab aa gaye' (mixture!)

📖 Alkyl halide invites **ammonia** to a sealed-tube party at **373 K**. But the 1° amine formed also invites its friends, who invite theirs... and you get a **baraat** 🎉 **of 1°, 2°, 3° amines + quaternary salt**! To keep it small, invite **lots of NH_3** → 1° major.

अमोनिया की बारात — 1°, 2°, 3° और चतुष्क लवण सब आ गए; अधिक NH_3 से 1° मुख्य।



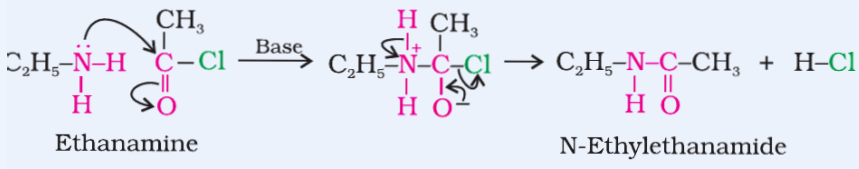
✍️ **Write in exam:** $RX + NH_3$ (ethanolic, 373 K) → RNH_2 → R_2NH → R_3N → $R_4N^+X^-$

44 Acylation of Amines ★★

💡 **'Acylation ke liye N pe H chahiye — Teesra khaali haath'**

📖 Acyl group (CH_3CO-) wants to **sit on a chair (H on N)** 🪑. 1° and 2° amines have chairs → form **amides** (aniline → acetanilide). 3° amines have **no chair** → no acylation. Pyridine cleans up the HCl.

ऐसिल को N पर H की कुर्सी चाहिए — 1°/2° में है, 3° खाली हाथ।



✍️ **Write in exam:** $C_6H_5NH_2 + (CH_3CO)_2O \rightarrow$ (pyridine) $\rightarrow C_6H_5NHCOCH_3$ (acetanilide)

One-page Rap 🎤 (एक पेज का रैप — ज़ोर से गाओ!)

🎵 **Finkel** finds the I, **Swarts** brings the F,
Wurtz doubles R, **Fittig** joins the rings — that's left!
Grignard hates water, keep the ether dry,
Zaitsev picks the richer alkene — don't ask why!

🎵 **Reimer** brings the CHO, **Kolbe** drinks the CO_2,
Williamson wants slim halides — 1° will do!
Cumene has two kids, Phenol and Acetone,
Lucas: three is quick, two is slow, one is gone!

🎵 **Rosenmund** sits in a Ba-basket, **Stephen** holds the tin,
Etard uses chromyl, **Gatterman–Koch** drinks CO in!
Clemmensen is sour, **Wolff** is basic and wild,
Aldol needs alpha-H, **Cannizzaro**'s the poor child!

🎵 **Hoffmann** cuts a carbon, **Gabriel** gives pure one-degree,
Carbylamine stinks, **Diazo** stays at zero-to-five degree!
Sandmeyer brings the salt, **Gatterman** the powder,
Coupling paints orange-yellow — sing it louder! 🎶

Hasna mana nahi, padhna zaroori hai! 😄 All the best! शुभकामनाएँ!