Organic Chemistry Basics - Class 11 Notes

Benzene, Resonance, Inductive aur Electromeric Effect, aur bhi - poore 27-minute video ke saare padhaye topics (Hinglish notes)

Video: youtu.be/d5ZSk_g8mlE (27:03) - Maida Learning Portal

> Video ki shuruaat jaisa: animation ke rang aur numbers idea samjhane ke liye bane hain, asli napi hui values nahi. Ye notes sirf is video mein padhaye gaye topics cover karte hain - poori Unit 8 ka complete coverage claim nahi. Boiling points normal pressure par aur bond lengths typical values hain.

1. Chromatography

0:00 - 8:32

Mixture aur component

Mixture = do ya zyada cheezon ka mel jisme har cheez apni pehchaan rakhti hai (ret + namak). Har alag cheez = component. Patti ke rang ka extract bhi ek mixture hai - isme pigments hote hain (rang dene wale padarth), jaise chlorophyll (hara) aur carotene (narangi). Chromatography ka kaam: mixture ke components alag karna.

Dissolve, solvent, immiscible

Chini paani mein dissolve (ghul) jaati hai; jis liquid mein cheez ghulti hai use solvent kehte hain. Tel aur paani nahi milte - aise do liquid immiscible hain. Same solvent ki same maatra aur same temperature par bhi alag padarth alag maatra mein ghulte hain; kisi ko ek solvent zyada 'pasand' hota hai (zyada tikta/ghulta hai). Yahi farak aage kaam karega.

Capillary action

Paper cellulose ke patle reshon ka bana hai. Liquid aur resha ke beech attraction = adhesion; liquid ke molecules ka ek doosre ko khinchna = cohesion. Dono milkar liquid ko patli nalli jaisi jagah mein upar chadhate hain = capillary action. Isi se solvent paper par upar chadhta hai.

Experiment ki setting

Chromatography paper ki patti par pencil se baseline kheencho (pencil ki line solvent mein nahi ghulti; pen ki ghul sakti hai). Leaf extract ka chhota dot baseline par hi lagao. Beaker mein solvent (paani se na milne wala mix, jaise petroleum ether + acetone). Patti ka neeche ka kinara solvent mein dube, par baseline solvent ke level se UPAR rahe - warna dot ke pigments seedhe solvent mein ghul ke beaker mein chale jaate, paper par chadhte hi nahi. Jahan tak solvent chadhe use solvent front kehte hain; sookhne se pehle pencil se mark kar lo.

Andar kya hota hai (partition)

Paper ke resho par paani ki ek patli layer chipki hoti hai jo apni jagah rukti hai = stationary phase (paper uska sahara hai). Upar chadhta solvent = mobile phase. Dono ek doosre mein nahi milte. Ek molecule kabhi chalte solvent mein ghulta hai (upar jaata hai), kabhi ruki layer mein tika rehta hai - ye aana-jaana baar baar hota hai. Is samay-baantne ko partition kehte hain. Jo padarth zyada samay mobile phase mein rahe wo zyada door jaata hai; jo zyada samay stationary phase mein rahe wo kam door. Isi se carotene jaise pigment upar aur chlorophyll jaise neeche rukta hai, aur dot alag heights par colour patches mein toot jaata hai.

Rf value

Rf = baseline se spot ke CENTRE tak ki doori / baseline se solvent front tak ki doori. Units kat jaati hain. Rf aam taur par 0 se 1 ke beech hota hai (spot solvent front se aage nahi jaata). Example: spot 3 cm, front 6 cm, Rf = 0.5. Practice: spot 2 cm, front 8 cm, Rf = 2/8 = 0.25. Zaroori: Rf ki tulna tabhi valid hai jab stationary phase, solvent aur temperature teeno same hon. Sirf Rf barabar hone se pehchaan pakki nahi hoti - Rf ek clue hai; known standards ke saath compare karte hain.

Alag tareeka

Paper ki jagah silica/alumina plate par components surface par chipakte hain = adsorption (jaise TLC). Wo alag method hai, uska explanation alag hai.

Self test

Dot ko solvent ke level se upar kyun rakhte hain? Jawab: warna dot ke pigments seedhe solvent mein ghul jaate aur paper par chadhte hi nahi.

2. Basics: atom, bond, charge

8:32 - 12:27

Atom aur valence electrons

Atom ke centre mein nucleus hota hai (carbon ke nucleus par +6 charge) aur bahar electrons. Sabse bahari shell ke electrons = valence electrons; bonding yahi karte hain.

Bond, ion, electronegativity

Do atoms ke beech shared electron pair = covalent bond. Charge aa jaane par ion banta hai. Shared pair hamesha barabar se share nahi hota - jis atom ki electronegativity (electron-khinchne ki power) zyada, pair uski taraf zyada hota hai. Us par partial negative (delta minus) aur doosre par partial positive (delta plus) charge dikhate hain.

Sigma aur pi bond

Sigma bond seedha (head-on) overlap se banta hai - single bond hamesha sigma. Pi bond p-orbitals ke upar-neeche (sideways) overlap se banta hai, double/triple bond mein sigma ke saath. Pi electrons bond ke upar aur neeche ke area mein hote hain - yahi aage electromeric effect mein kaam aayega.

3. Fractional Distillation

12:27 - 15:36

Basic idea

Do miscible liquids ke boiling points alag hon to unhe ubaal kar alag karte hain. Normal atmospheric pressure par pure ethanol ka boiling point lagbhag 78 C aur paani ka 100 C. Ethanol-pehle-ubalta-hai isliye vapour mein ethanol ki maatra mixture se zyada hoti hai.

Fractionating column

Setup: flask, upar fractionating column (andar beads), thermometer, condenser, aur nikalta distillate. Column mein vapour baar baar thanda ho kar phir ubalta hai (repeated boil-condense steps), isliye upar pahunchti vapour ethanol mein aur zyada rich hoti jaati hai.

Azeotrope ki limit

Is method se ethanol-paani ko 100% tak nahi alag kar sakte. Lagbhag 95.6% ethanol par ek azeotrope ban jaata hai jo ek hi boiling point par saath ubalta hai - yahi is technique ki limit hai.

4. Benzene

15:36 - 17:09

Ring aur Kekule drawing

Benzene 6 carbon ki ring hai jisme har carbon se ek hydrogen juda hai. Kekule ne use alternating single-double bonds wali ring ke roop mein draw kiya tha.

Asliyat

Typical C-C single bond 0.154 nm aur C=C double bond 0.134 nm hota hai (typical values). Agar Kekule drawing sahi hoti to benzene mein 3 lambi aur 3 chhoti bonds hoti. Asli napi values mein benzene ki sab 6 C-C bonds bilkul barabar hain - single aur double ke beech ki length. Kekule drawing poori kahani nahi kehti.

5. Resonance

17:09 - 19:03

Curved arrow

Curved arrow electron PAIR ke movement ko dikhata hai - pair kahan se kahan shift ho raha hai.

Do drawings, ek molecule

Benzene ko double bonds ki do alag positions ke saath draw kar sakte hain. Ye do alag molecules NAHI hain - dono drawings ek hi molecule ki hain. Inhe double-headed arrow se jodte hain; ye arrow reversible reaction wala arrow nahi hai.

Resonance hybrid

Asli molecule in dono drawings ka mel = resonance hybrid. Isliye benzene ko hexagon ke andar circle se dikhate hain - pi electrons poore ring par fail kar sab bonds barabar karte hain.

6. Nucleophile aur Electrophile

19:03 - 21:18

Reagent

Reaction mein doosri species par attack karne wala chemical = reagent.

Nucleophile

Wo reagent jo apna electron pair DETA hai (nucleus/positive ya delta+ jagah se attract hota hai). Example: OH- ke paas lone pairs hain. Curved arrow nucleophile ke lone pair se shuru ho kar electrophile par khatam hota hai. Types: neutral nucleophiles - NH3, H2O (lone pairs hain); negative nucleophiles - OH-, Cl-.

Electrophile

Wo reagent jo electron pair LETA hai (electron se pyaar). Types: positive electrophiles - jaise H+; neutral electrophiles - jaise alkyl halide (CH3Cl ka delta+ carbon) aur carbonyl carbon (C=O mein carbon delta+).

Question

H2O nucleophile hai ya electrophile? Nucleophile - oxygen ke paas lone pairs hain jo de sakta hai.

7. Inductive Effect

21:18 - 22:40

Definition

Sigma bond chain mein electronegative atom (jaise Cl) electron density apni taraf khinchta hai. C-C-C-Cl chain mein Cl ke paas wala carbon sabse zyada delta+, aur ye effect agle carbon par kam, uske agle par aur kam - distance ke saath jaldi ghat-ta hai.

Properties

Ye sigma bonds ke through hota hai, permanent hota hai (kisi reagent ki zaroorat nahi).

+I aur -I

Hydrogen ko zero reference maana hai. H se zyada electron-push karne wala group +I (jaise CH3 push karta hai); H se zyada pull karne wala -I (jaise Cl).

8. Electromeric Effect

22:40 - 24:31

Textbook definition

Attacking reagent ke paas aane par pi electron pair POORA ek atom par shift ho jaata hai. Ye temporary shift hai - reagent ki maujoodgi mein hota hai.

Example: propanone + CN-

Cyanide (nucleophile) carbonyl ke delta+ carbon ki taraf aata hai. Do curved arrows EK HI step mein: (1) CN- ke lone pair se carbon tak - naya bond banata hai; (2) C=O ke pi pair se oxygen tak - pair poora oxygen par chala jaata hai. Pi pair pehle akela kahin nahi rukta. Is step ke baad oxygen par negative charge aur carbon cyanide se jud chuka hota hai.

Dhyan rakhna

Jab reaction ho gayi to naya C-CN bond reaction ka PRODUCT hai, sirf temporary shift nahi. Temporary wali baat sirf tab hai jab reagent paas aaya ho par reaction poori na hui ho. (Note: 'electromeric effect' textbook term hai - IUPAC is term ko obsolescent manta hai, par school/board mein yahi naam aata hai.)

9. Inductive vs Electromeric - Dono ka FARK

24:31 - 25:13

Comparison table

	Inductive	Electromeric
Kab	Permanent, hamesha rehta hai	Temporary, reagent aane par
Kahan	Sigma bonds ke through	Pi electron pair par
Kitna	Pair thoda khinchta hai (partial charge)	Pi pair POORA ek atom par shift
Reagent	Zaroorat nahi	Zaroori hai

Question

Bina reagent ke kya pi pair move karega? Nahi - electromeric shift ke liye attacking reagent chahiye; inductive apne aap (permanent) rehta hai.

10. Free Radicals (homolytic vs heterolytic)

25:13 - 27:03

Homolytic cleavage

Cl-Cl bond par UV (ultraviolet) light padne par bond ka ek-ek electron har Cl atom ko milta hai = homolytic cleavage. Isse banne wala species, jisme unpaired electron ho (Cl dot), = free radical. Free radicals bahut reactive hote hain.

Heterolytic comparison

Heterolytic cleavage mein poora PAIR ek atom ko chala jaata hai aur ions bante hain - ye alag tareeka hai.

Arrow rule

Full-headed arrow = electron PAIR ka movement. Half-headed (fish-hook) arrow = SINGLE electron ka movement. UV wale homolytic case mein half-headed arrows use hote hain.

Maida Learning Portal - Free study resources. Source: hamara apna video lesson (link upar). Ye official NCERT solutions nahi hain.