NMR Techniques for Carbohydrate Structure Elucidation — Hands-on

Develop practical understanding of how NMR spectroscopy is used to resolve carbohydrate structures. This module covers NMR active nuclei, key 1D and 2D experiments, data interpretation for linkage and anomeric configuration, and basic conformational analysis for mono and oligosaccharides.

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Session Index

Session 1

Fee: Rs 8800 Apply Now

NMR Fundamentals for Carbohydrates

NMR principles and hardware overview

magnet, probe and gradients | **spectrometer field strengths** | **lock, shim and tuning basics**

NMR active nuclei and relevance for glycans

1H and 13C observation | **sensitivity and natural abundance** | **decoupling concepts**

Sample preparation for carbohydrate NMR

concentration and pH | deuterated solvents | reference standards and temperature

Session 2

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1D and 2D NMR Experiments for Assignment

1D spectra and basic interpretation

1H and 13C reference spectra | chemical shifts and J couplings | anomeric region inspection

Key 2D correlation experiments for carbohydrates

COSY and TOCSY for spin systems | HSQC and HMQC for 1H–13C pairs | HMBC for long range links

NOESY and ROESY for spatial proximity

NOE patterns in pyranoses | mixing time considerations | link to conformation and contacts

Session 3

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Interpretation, Linkage and Conformation

Assigning residues in mono and disaccharides

spin system identification | anomeric configuration cues | common chemical shift ranges

Determining linkage positions and connectivity

HMBC cross peaks for linkages | differences for 1–3 vs 1–4 links | branch point signatures

Conformational analysis and dynamics indicators

J coupling and dihedral angles | NOE pattern based

models temperature and pH effects

Session 4

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Mini Capstone: NMR Structure Elucidation Case Study

From spectra to structure for a model oligosaccharide

Theory plus Practical

Stepwise assignment using 1D and 2D datasets

building an assignment table annotated spectrum figures linking to glycan cartoons

Deliverables: annotated spectra and structure summary

PDF or PPTX report assignment spreadsheet final glycan structure diagram