



# Carbohydrates

Innovative solutions for custom synthesis, analysis and GMP manufacturing of complex multi-step carbohydrates

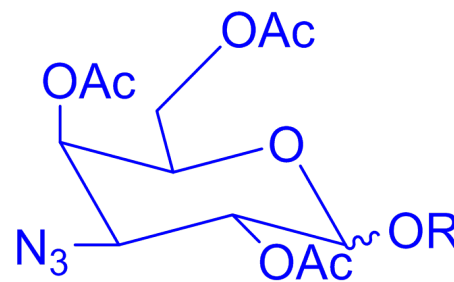
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Monosaccharides | Polysaccharides | Iminosugars | Carbocyclic sugars |  
Nucleosides | Locked Nucleic Acids (LNA) | Glycopeptides and Thioglycosides |  
Nucleosides containing - Ribose | Deoxy - Ribose | Fluorine | Methyl Sugars

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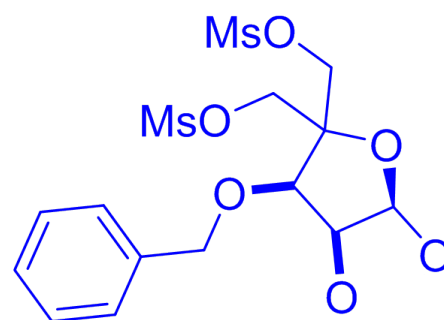
## Capabilities:

- Multi-step carbohydrate synthesis
- Linear and convergent synthesis
- Selective protection and deprotection
- Control of selectivity in moisture-sensitive glycosylation
- Handling of triflates, azide transfer and oxidations
- Purification Techniques: C-18 purification, Gel Permeation Chromatography (GPC), Size Exclusion Chromatography (SEC), Strong Anion Exchange (SAX)
- Isolation Techniques: Crystallization, anti solvent precipitations, lyophilization



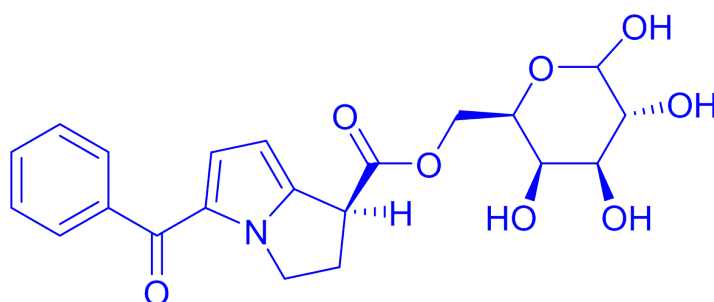
## Lab infrastructure

- PR & D Labs equipped with Radleys parallel reaction stations, Plant simulation automated reactors
- Process safety equipment (DSC, TSU and Reaction calorimetry)
- 1 Akta explorer ion exchange chromatography
- 1 Aktaprime plus ion exchange chromatography
- Virtis Programmable Tray 3 L capacity
- Virtis Bench top 1.5 L capacity



## Manufacturing infrastructure

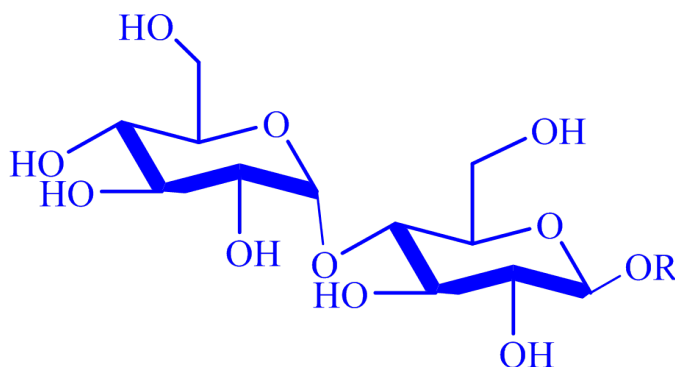
- Varied range of reactors and MOCs, downstream equipment for filtration, crystallization and drying, containment facility for pentasaccharides
- C-18 purification
- Gel Permeation Chromatography (GPC)
- Size Exclusion Chromatography (SEC)
- Strong Anion Exchange (SAX)



# Analytical capability

## Less or no chromophore substrates

- Evaporative light scattering detection
- Refractive Index (RI)
- CAD detector
- Low wavelength UV detector
- Range of specialized carbohydrate columns
- Ion exchange chromatography for polar moieties



## Analysis of counter ions

- Ion chromatography by conductivity detection

## Characterization of API and its impurities by

- LC-QqQ-MS, LC-Tof instrument for characterization
- 600 MHz nuclear magnetic resonance spectrometry

## Carbohydrate chemistry for clinical molecules

- Purification techniques
- Clinical supply
- GMP manufacturing of intermediates and APIs
- Process validation
- Method verification
- Method validation

