

Synthesis of sugar based crown ethers and their ion-selectivity measured by mass spectrometry

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The crown ethers are (-CH₂-CH₂-Y)_n sequential unit-based heterocyclic compounds, where Y is a heteroatom with lone electron pair, mainly oxygen, sulphur or nitrogen.

When a side arm containing another heteroatom is attached to the crown ring, lariat ethers are formed, and this is a way to achieve strong and selective three-dimensional binding of metal cations via the cooperative binding provided by the crown ether moiety and the side-arm [1-3].

An important advantage of azacrown ethers over oxacrown ethers is the presence of soft nitrogen donor atoms which may offer characteristic complexing and transporting abilities.

Chiral monoaza-15-crown-5 lariat ethers attached to a 1,2-*O*-isopropylidene- α -D-glucopyranoside unit, monoaza-16-crown-5 lariat ethers fused to 1,2-*O*-isopropylidene- α -D-glucopyranoside- and 1,2-*O*-isopropylidene- α -D-xylofuranoside units have been synthesized.

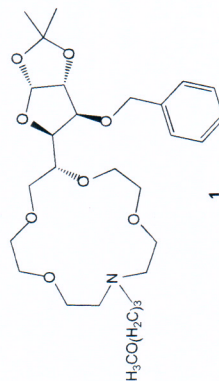
The incorporation of the carbohydrate scaffold is advantageous in the synthesis of macrocycles: the starting carbohydrates are inexpensive, and easily available commercial products. The complexing ability and cation

selectivity of these lariat ethers containing hydroxypropyl- and methoxypropyl side arms on the nitrogen atom of the crown ring were investigated.

The binding affinities of ionophores towards 10 different biologically important metal ions were measured by competitive experiments which were exhibited on a triple quadrupole mass spectrometer equipped with an electrospray ionization source.

Comparative Na⁺/Ag⁺ measurements were also carried out for the compounds showing affinity towards silver ions [4].

Of the 1,2-*O*-isopropylidene- α -D-glucopyranoside based lariat ethers one (1) exhibited a high selectivity for the silver ion. Our experience is rather surprising, as the selective ionophores described earlier were macrocycles typically with sulphur atoms.



References:

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