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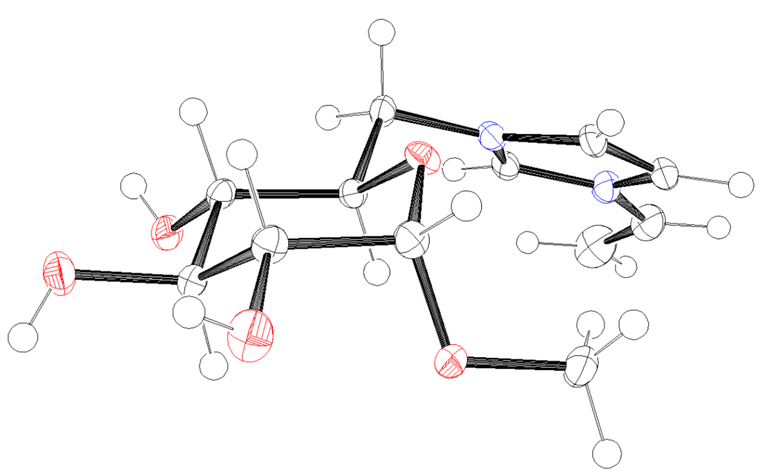

Synthesis and Characterization of Carbohydrate-based Ionic Hydrogels

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Introduction

Hydrogels are 3D-crosslinked polymeric structures consisting of a monomer and a crosslinker (N,N'-methylenebis-acrylamide, Mbis). They are used in medical applications such as contact lenses or drug delivery systems.[1] Hydrogels with an intact carbohydrate component are promising materials for bio-medical applications. These covalently crosslinked networks are obtained and the swelling behavior were investigated.

Synthesis

Methyl-α-D-glucopyranoside (MeGlu) was converted into an iodine leaving group sugar (MeGluI) using an optimized Appel reaction.[2] The iodinated compound was then quarternized using 1-vinylimidazole into MeGluVIM (Fig. 1).[3]

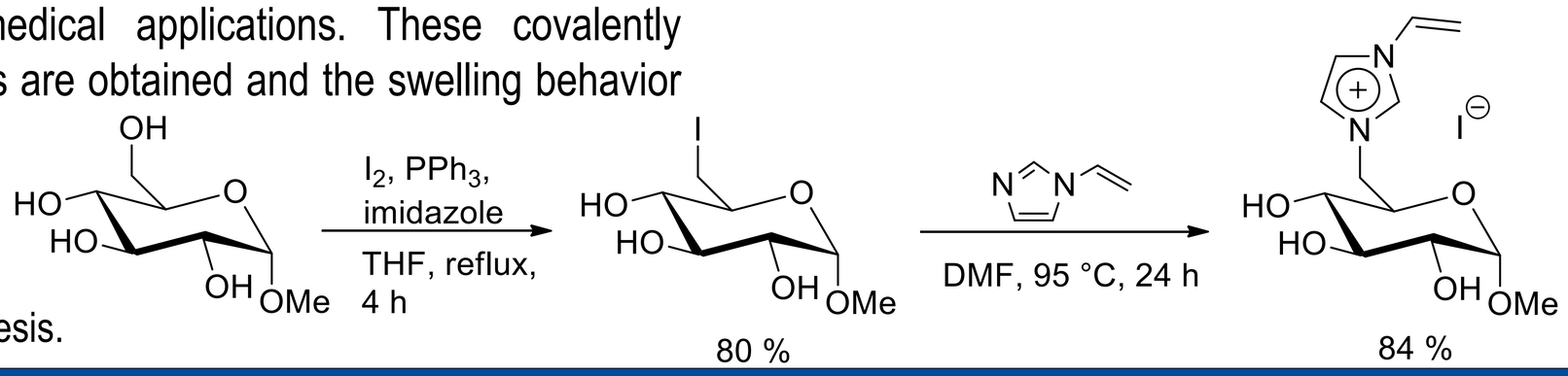

Fig. 1. Two step synthesis.

Results

Gelation

For the synthesis of the hydrogels the MeGluVIM was dissolved in water, the crosslinker Mbis and ammonium peroxodisulfate (APS) solution was added. After dissolving the mixture, N,N,N‘,N‘-tetramethylethylenediamine (TEMED) was added and the hydrogel gelated within five to fiveteen minutes (Fig. 2).

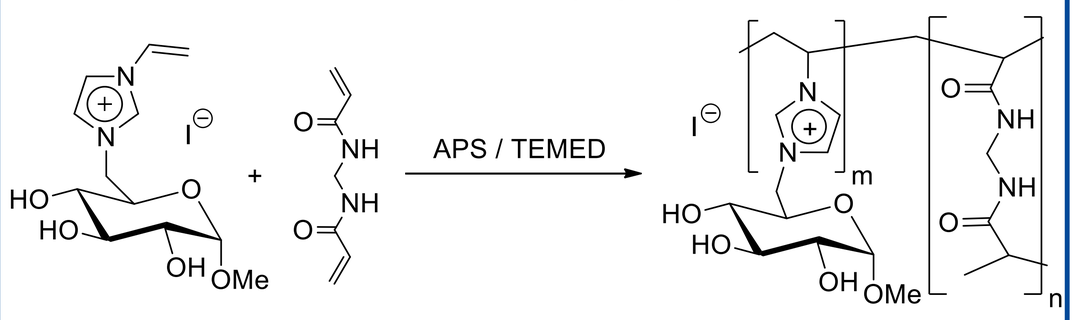

Fig. 2. Radical polymerization for the synthesis of hydrogels.

Swelling Degree

The swelling degree of a hydrogel is an important parameter to characterize the behavior in aquatous media.

$$q_t = \frac{(m_t - m_0)}{m_0}$$

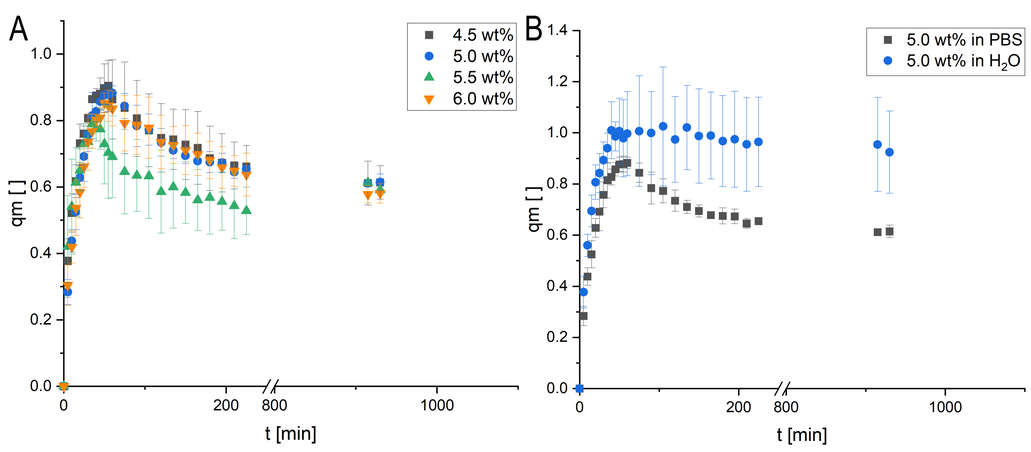

Fig. 3. Swelling degree (qm) of hydrogels with (A) different crosslinker concentrations in PBS buffer and (B) 5.0 wt% Mbis in PBS and water.

Summary and Outlook

- Low swelling degree
- Different swelling behavior in different media

- Test different crosslinker
- Biocompatibility tests
- Anion variation

References

[1] P. Calvert, *Adv. Mater.* **2009**, 21, 743-756.

[2] J. Schnegas, S. Jopp, *Compounds* **2021**, 1, 154-163.

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