

# Investigation of the Influence of Anion Exchange on the Swelling Behavior of Carbohydrate Based Ionic Hydrogels

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Hydrogels are defined as hydrophilic networks consisting of cross-linked polymers that have the ability to absorb large amounts of water while the hydrogels shape is retained. In this work, novel glucose-based ionic hydrogels 5a-d were synthesized and their swelling behaviour was assessed.



## Swelling

Degree of swelling:



The equilibrium swelling degree decreases in the order OMs > OAc > OTf >  $NTf_2$ , which is in good agreement with the anion's hydrophobicity.



In addition to procedures published previously, further purification of the product using  $_{\rm HO}$ activated carbon was necessary in order to allow for subsequent hydrogel synthesis.

vinylimidazolium salts 3a—d using silver precipitation.









Hydrogels 5a-d were prepared from 4a-d by radical polymerization using ammonium peroxodisulfate (APS) and tetramethylethyl-



**Figure 3**: Hydrogels obtained from 4a-d and general structure of polymers.

enediamine (TEMED) as the initiator and activator, respectively. Methylenebisacrylamide (MBAA) was used as the cross-linker to form a three-dimensional network.

**Figure 4**: Swelling behavior of hydrogels 5a-d. (A) Swelling in water. (B) Comparison of swelling in water and phosphate buffered saline (PBS) for 5a, b. Swelling experiments were performed at  $37 \pm 2$  °C.

## Summary

- Synthesis of four novel glucose-based salts only differing in the respective anion
- Preparation of hydrogels from these novel salts
- Traces of silver may interfere with hydrogel synthesis X Swelling behaviour reflects hydrophobicity of the present anion  $\checkmark$

### **References:**

[1] J. Schnegas, S. Jopp, *Compounds* **2021**, 1, 154-163. [2] P. Lehmann, S. Jopp, *ChemistryOpen* **2022**, *11*, e202200135. [3] S. Lambrecht, H. Schröter, H. Pohle, S. Jopp, 2023 ACS Sustainable Chem. Eng. submitted.

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