PROTON MOBILITY OF HYALURONAN AND DERIVATIVES IN SOLUTION

Davide Ret[a], Gökçe Mihlaç[a b], Stefano Gentilini[a] and Simone Knaus[a]

[a] Vienna University of Technology, Institute of Applied Synthetic Chemistry, Vienna, Austria
[b] Departmant of Chemistry, Istanbul Technical University, Turkey

Hyaluronic acid (HA) is a biomaterial used in medical and esthetic application such as eye surgery, viscosupplementation therapy of osteoarthritis, dermal filling, and tissue augmentation. To improve the chemical and physical properties in biological systems hyaluronic acid is chemically modified. In establishment of the relationship between different degrees of modification and mechanical properties as well as biocompatibility the accurate determination of the degree of substitution (DS) is of great importance.

An effective and wide spread method for determining the DS is ^{1}H-NMR spectroscopy. This method gives accurate results only when the implied protons are mobile [1]. Hyaluronic acid proton mobility is affected by many parameters as: molecular weight, concentration, ionic force, pH and temperature.

In the present work the determination of the DS was intensively studied and the relationship between particle size, conformation in solution and proton mobility was elucidated. It will be shown that accurate determination of the DS by 1H-NMR spectroscopy for HA derivatives is possible (Figure 1) and that the same principle can be used for other glycosaminoglycans.

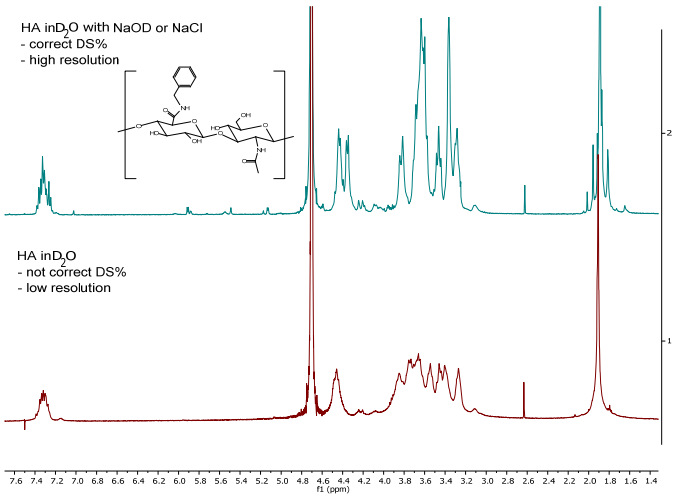

Figure 1 –^{1}H-NMR spectrum of HA benzylamine derivate acquired in D_2O without and with NaOD or NaCl.

[1] Michel, M. and R. Marguerite, Characterization and Properties of Hyaluronic Acid (Hyaluronan), in Polysaccharides, CRC Press 2004