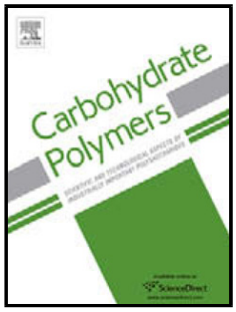

Title: Synthesis and characterization of POLYAMPHOLYTIC aryl-sulfonated chitosans and their in vitro ANTICOAGULANT ACTIVITY

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SYNTHESIS AND CHARACTERIZATION OF POLYAMPHOLYTIC ARYL-SULFONATED CHITOSANS AND THEIR IN VITRO ANTICOAGULANT ACTIVITY

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Highlights

A strategy to introduce sulfonate groups on the chitosan backbone has been developed
Synthesis and characterization of bioactive sulfonated chitosan through reductive amination reaction has been conducted
Sulfonated chitosan played the role of a polyelectrolyte and exhibits an *in vitro* anticoagulant activity

Abstract

This work firstly aimed to synthesize mono- and di- sulfonic derivatives of chitosan by reductive amination reaction using respectively 2-formyl benzene sulfonic acid and 2,4 formyl benzene sulfonic acid sodium salts. The influence of the reactants molar ratio (R), aryl - substituted amino groups versus chitosan free amino groups, on the degree of substitution (DS) of both sulfonated chitosans was assessed by ^{1}H NMR, elemental analysis, coupled conductometry-potentiometry analysis and UV spectrometry and FTIR. The influence of pH on sulfonated chitosans' properties in solution were investigated by solubility and zeta potential (ZP) studies, size exclusion chromatography equipped with MALLS detection (SEC-MALLS) and Taylor dispersion analysis (TDA). The polyampholytic character of both series was evidenced and strongly modified the solutions properties compared to chitosan. Then, the anticoagulant properties of mono- and di- sulfonic polymers were investigated by the measurement of the activated partial thromboplastin time (aPTT), Prothrombin-time (PT) and anti-(factor Xa).

Keywords: chitosan; sulfonated chitosan; reductive amination; polyampholyte; anticoagulant

1. INTRODUCTION

Chitosan (CHT) is a natural biopolymer known for its excellent biocompatibility, biodegradability, hemocompatibility, wound healing and antibacterial properties. Therefore, chitosan is a material of choice in the design of a wide range of applications in the biomaterials field, such as wound dressings (Mohandas, Deepthi, Biswas & Jayakumar, 2017), injectable hydrogels (Liu, Gao, Lu & Zhou, 2016), and scaffolds for tissue