



Industrial Consultancy & Sponsored Research (IC&SR)

A RAPID SHEAR-INDUCED METHOD FOR THE PREPARATION OF CHITOSAN GEL

IITM Technology Available for Licensing

Problem Statement

- Chitin is an amino polysaccharide, which is extracted from the exoskeleton of crustaceans such as crabs, prawns, lobsters & from the cell-wall of few fungi & chitosan solution has been used to flocculate or coagulate negatively-charged organic/inorganic impurities from wastewater, due to its polycationic nature.
- The gelation of chitosan has been done using two techniques; crosslinking & copolymerization. However, those techniques are not able to produce gel due to using non-biodegradable grafts.
- A few prior arts method discussed herein which **lack mechanical stability & susceptible to change in pH, temperature, ionic strength.**
- Hence, it is needed to address above issues.

Technology Category/Market

Technology: Method for the preparation of chitosan

Industry: Pharmaceutical Waste-water treatment; **Applications:** Water Treatment;

Market: The global Chitosan market is projected to reach at a **CAGR of 20.1%** during (2023-2030).

Intellectual Property

IITM IDF Ref. 1593; Patent No: 404015

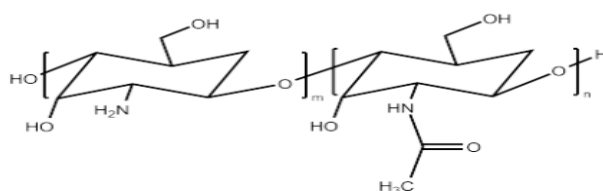
Technology

- Present patent claimed a **rapid shear induced method of forming chitosan gels using ionotropic gelation technique.**(Refer Fig.1)
- Said method comprises the steps of:
 - **First Step** describes about preparing a **chitosan solution** by dissolving chitosan in a mildly acidic aqueous solution;
 - **Second step** describes about **forming a mixture by adding a water-soluble metal salt** to said chitosan solution;
 - **Third step** describes about adding a solution of a water-soluble phosphate **salt** or Phosphoric **acid**, to said mixture of water soluble metal

salts and said chitosan solution; and

- **Fourth step** describes about **shaking said mixture** of said water-soluble metal salt, the water-soluble **phosphate salt & the chitosan solution** to generate metal phosphates, in situ, & **form the chitosan gels, without** post processing or neutralization step.

Structure of Chitin & Chitosan



Copolymer of D-Glucosamine and N-Acetyl D-Glucosamine
- Chitosan, when D.A. (n*/100/m+n) < 50 %
- Chitin, when D.A. > 50 %

Fig.1

Key Features / Value Proposition

Technical Perspective

- Proposed chitosan gelation is produced either by shaking the mixture for a particular duration of **ten seconds**, or by longer storage of the mixture.
- Said mildly acidic aqueous solution is selected among the group of **acetic acid, hydrochloric acid, nitric acid, formic acid and trifluoroacetic acid**, wherein the **pH level** of mildly acidic aqueous solution <6.5.

Industrial Perspective

- Bridgeable cost-effective method** having features as mechanical stability, other parameters(pH, temperature & ionic strength).
- Applicable **Biotechnology & environmental applications**

TRL (Technology Readiness Level)

TRL-3, Proof of Concept & validated

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