

**SINTESIS DAN KARAKTERISASI NANOPARTIKEL KITOSAN  
DENGAN METODE GELASI IONIK**

**SKRIPSI**

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Sarjana Sains  
Program Studi Kimia



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ALAM  
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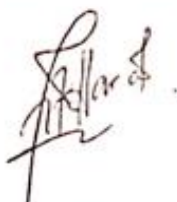
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## ABSTRAK

Nanopartikel kitosan (NPCS) telah banyak diaplikasikan pada berbagai bidang seperti agen antimikroba, agen antitumor dan *carrier* obat. Penelitian ini bertujuan untuk mengetahui kondisi optimum sintesis NPCS dengan metode gelasi ionik menggunakan tripolifosfat (TPP) sebagai *counter-ion* dan karakterisasinya. NPCS disintesis dengan mereaksikan 10 mL CS dengan 3 mL TPP pada kondisi pH 3 - 4,5, rasio mol 0,02:1 – 0,1:1 dan kecepatan pengadukan 400 – 900 rpm. Massa molekul kitosan ditentukan dengan viskometer ostwald. Karakteristik NPCS dievaluasi dengan *Particle Size Analyzer* (PSA), *Fourier Transform Infrared* (FTIR), *X-Ray Diffraction* (XRD) dan *Scanning Electron Microscopy* (SEM). Dari hasil penelitian diketahui massa molekul ( $M_v$ ) CS adalah 33.382 g/mol yang termasuk pada kitosan massa molekul rendah. Kondisi optimum ditentukan dari nilai turbiditas terendah. Kondisi optimum sintesis NPCS diperoleh pada pH 3,5, rasio komposisi CS/TPP (mol) 0,05:1 dan kecepatan pengadukan 700 rpm. Kondisi optimum diperoleh dari hasil pengujian nilai turbiditas terkecil. Ukuran NPCS rata-rata yang diperoleh pada kondisi optimum adalah 77,71 nm dengan bentuk morfologi menyerupai sferis seperti ditunjukkan gambar SEM. Spektra FTIR dan difraktogram XRD mengkonfirmasi bahwa pembentukan NPCS didominasi melalui interaksi ionik antara CS dengan TPP.

***Kata kunci:*** kitosan, tripolifosfat, gelasi ionik, nanopartikel kitosan

## ABSTRACT

*Chitosan nanoparticles (NPCS) has been widely applied in various area such as antimicrobial agent, antitumor agent and drugs delivery. This study aims to determine optimum conditions for NPCS synthesis throughout the ionic gelation method using tripolyphosphate (TPP) as counter-ions and its characteristics. NPCS synthesized by reacting 10 ml of chitosan (CS) and 3 ml of TPP at variation of pH 3 – 4.5, mole ratio 0.02:1 – 0.1:1, and mixing speed 400 – 900 rpm. The molecular mass (Mv) of CS was determined using viscometer Ostwald. Characteristics of synthesized NPCS were evaluated using Particle Size Analyzer (PSA), Fourier Transform Infrared (FTIR), X-Ray Diffraction (XRD) and Scanning Electron Microscopy (SEM). The results showed that CS has Mv 33,382.34 g/mol which is categorized as low molecular weight chitosan. The optimum conditions obtained from the lowest turbidity value. The optimum conditions for NPCS synthesis were at pH of 3.5, CS/TPP mole ratio of 0.05:1, and mixing speed of 700 rpm. The average particle size at optimum conditions was 77.71 nm with spherical like shape as shown by SEM image. The FTIR spectra and XRD diffractogram confirmed that the formation of NPCS was predominantly occurred through the ionic interaction between CS and TPP.*

**Keywords:** *chitosan, tripolyphosphate, ionic gelation, chitosan nanoparticles*

## DAFTAR ISI

<b>LEMBAR PENGESAHAN</b> .....	
<b>LEMBAR PERNYATAAN</b> .....	
<b>KATA PENGANTAR</b> .....	
<b>UCAPAN TERIMA KASIH</b> .....	
<b>ABSTRAK</b> .....	
<b>DAFTAR ISI</b> .....	
<b>DAFTAR GAMBAR</b> .....	<b>Error! Bookmark not defined.</b>
<b>DAFTAR TABEL</b> .....	
<b>DAFTAR LAMPIRAN</b> .....	
<b>BAB I (Pendahuluan)</b> .....	
1.1 Latar Belakang .....	
1.2 Rumusan Masalah .....	
1.3 Tujuan.....	
1.4 Manfaat.....	
1.5 Struktur Organisasi Skripsi .....	
<b>BAB II (Kajian Pustaka)</b> .....	
2.1 Kitosan.....	
2.2 Sintesis Nanokitosan .....	
2.3 Metode Gelasi Ionik .....	
2.4 Karakterisasi Nanokitosan.....	
2.1 <i>Fourier Transform Infrared (FTIR)</i> .....	
2.2 <i>Scanning Electron Microscopy (SEM)</i> .....	
2.3 <i>X-Ray Diffraction (XRD)</i> .....	
2.4 <i>Particle Size Analyzer (PSA)</i> .....	
2.5 Penentuan Massa Molekul Kitosan .....	
<b>BAB III (Metode Penelitian)</b> .....	
3.1 Waktu dan Tempat Penelitian .....	
3.2 Alat dan Bahan .....	
3.3 Metode Penelitian.....	
3.4 Prosedur Penelitian.....	

3.4.1	Menghitung Massa Molekul CS dengan Viskometer Ostwald .....
3.4.2	Sintesis NPCS .....
3.4.3	Karakterisasi NPCS.....
<b>BAB IV (Hasil dan Pembahasan) .....</b>	
4.1	Massa Molekul CS .....
4.2	Optimasi Kondisi Optimum Sintesis NPCS .....
4.2.1	Optimasi pH optimum.....
4.2.2	Optimasi Rasio Komposisi CS/TPP.....
4.2.3	Optimasi Kecepatan Pengadukan.....
4.3	Karakterisasi Nano Kitosan.....
4.3.1	<i>Fourier Transform Infrared (FTIR)</i> .....
4.3.2	<i>X-Ray Diffraction (XRD)</i> .....
4.3.3	<i>Scanning Electron Microscope (SEM)</i> .....
<b>BAB V (Kesimpulan dan Saran).....</b>	
<b>DAFTAR PUSTAKA .....</b>	
<b>LAMPIRAN.....</b>	

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