ABSTRAK

PENGARUH VARIASI KONSENTRASI KITOSAN CANGKANG KERANG HIJAU (*Perna viridis)* TERHADAP KARAKTERISTIK BIOPLASTIK BERBASIS KITOSAN DENGAN PENAMBAHAN PATI SINGKONG, GLISEROL DAN ASAM SITRAT

Peningkatan penggunaan plastik berbasis petrokimia menimbulkan pencemaran lingkungan karena sulit terdegradasi secara alami. Bioplastik berbasis biopolimer seperti kitosan dan pati merupakan salah satu alternatif kemasan ramah lingkungan yang dapat dikembangkan. Penelitian ini bertujuan untuk menganalisis keberhasilan sintesis bioplastik berbasis kitosan cangkang kerang hijau (*Perna viridis*) dan pati singkong dengan penambahan gliserol sebagai *plasticizer* dan asam sitrat sebagai *crosslinker*, menganalisis pengaruh variasi konsentrasi kitosan terhadap sifat fisik, mekanik, morfologi, dan biodegradabilitas bioplastik, serta mengevaluasi kesesuaiannya dengan SNI 7188.7:2016. Penelitian diawali dengan ekstraksi kitosan melalui tahap deproteinasi, demineralisasi, depigmentasi, dan deasetilasi, serta isolasi pati singkong menggunakan metode sedimentasi. Bioplastik disintesis dengan variasi rasio kitosan dan pati, kemudian dikarakterisasi menggunakan *Fourier Transform Infrared* (FTIR) dan *Scanning Electron Microscope* (SEM), serta diuji kadar air, daya serap air, ketebalan, kuat tarik, elongasi, modulus elastisitas, dan biodegradabilitas. Hasil penelitian menunjukkan rendemen kitosan sebesar 13,14%, kadar pati total 69,57%, kadar amilosa 10,24%, dan kadar amilopektin 89,76%. Analisis FTIR mengonfirmasi terbentuknya bioplastik melalui adanya gugus fungsi khas serta interaksi ikatan hidrogen dan ikatan silang antara kitosan, pati, gliserol, dan asam sitrat. Peningkatan konsentrasi kitosan meningkatkan ketebalan, kuat tarik, modulus elastisitas, dan biodegradasi, namun menurunkan elongasi serta ketahanan air. Morfologi permukaan bioplastik menjadi lebih homogen dengan bertambahnya konsentrasi kitosan. Variasi komposisi kitosan:pati 2:2 menghasilkan karakteristik terbaik. Bioplastik yang dihasilkan telah memenuhi sebagian parameter SNI 7188.7:2016, terutama kadar air dan biodegradabilitas, namun masih memerlukan optimasi untuk meningkatkan sifat mekaniknya.

Kata Kata kunci: Asam sitrat; Biodegradabilitas; Bioplastik; Gliserol; Kitosan; Pati singkong.

ABSTRACT

THE EFFECT OF CHITOSAN CONCENTRATION VARIATIONS FROM GREEN MUSSELS (Perna Viridis) SHELLS ON THE CHARACTERISTICS OF CHITOSAN-BASED BIOPLASTICS WITH THE ADDITION OF CASSAVA STARCH, GLYCEROL AND CITRIC ACID

The increasing use of petroleum-based plastics has caused serious environmental problems due to their resistance to natural degradation. Bioplastics derived from natural biopolymers, such as chitosan and starch, have emerged as environmentally friendly alternatives. This study aimed to investigate the successful synthesis of bioplastics based on green mussel shell (Perna viridis) chitosan and cassava starch using glycerol as a plasticizer and citric acid as a crosslinking agent, to evaluate the effect of chitosan concentration on the physical, mechanical, morphological, and biodegradation properties of the bioplastics, and to assess their compliance with SNI 7188.7:2016. Chitosan was extracted through deproteinization, demineralization, depigmentation, and deacetylation, while cassava starch was isolated by sedimentation. Bioplastics with different chitosan-to-starch ratios were characterized using Fourier Transform Infrared (FTIR) spectroscopy and Scanning Electron Microscopy (SEM), followed by physical, mechanical, and biodegradability tests. The results showed a chitosan yield of 13.14%, total starch content of 69.57%, amylose content of 10.24%, and amylopectin content of 89.76%. FTIR analysis confirmed successful bioplastic formation through characteristic functional groups and the formation of hydrogen bonding and crosslinking interactions among chitosan, starch, glycerol, and citric acid. Increasing chitosan concentration improved thickness, tensile strength, Young's modulus, and and biodegradation, but reduced elongation and water resistance rate. SEM analysis revealed a more homogeneous surface morphology with higher chitosan content. The 2:2 chitosan-to-starch ratio exhibited the best overall properties. The resulting bioplastics met several quality requirements of SNI 7188.7:2016, particularly moisture content and biodegradability, although further optimization is required to improve their mechanical properties.

Keywords: Biodegradability; Bioplastic; Cassava starch; Chitosan; Citric acid; Glycerol.