Modifikasi Ikat Silang Selulosa/PVA yang Diperkuat dengan Kitosan sebagai Bioplastik Antimikroba dan Antioksidan = Modified Crosslinking Cellulose / PVA Strengthened with Chitosan as Antimicrobial and Antioxidant Bioplastic

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Abstrak

Banyaknya penggunaan plastik konvensional menyebabkan penumpukan sampah plastik, sehingga menimbulkan masalah lingkungan. Plastik biodegradable berbahan dasar selulosa dapat digunakan sebagai alternatif pengganti plastik konvensional, karena ramah lingkungan, mudah didapat dan mudah terdegradasi. Namun, penggunaan selulosa sebagai bahan dasar bioplastik diperlukan modifikasi fisika atau kimia untuk meningkatkan sifat fisik dan mekaniknya. Pada penelitian ini, peningkatan sifat fisik dan mekanik bioplastik berbahan dasar selulosa dilakukan dengan penambahan PVA dan menggunakan agen pengikat silang glutaraldehid serta filler kitosan. Optimasi sintesis film selulosa/PVA dilakukan dengan variasi glutaraldehid 0-56% dan kitosan 0-33%. Hasil sintesis film bioplastik diuji ketebalan, swelling dan kelarutan, biodegradabilitas dan sifat mekanik, konsentrasi optimum masing-masing variasi glutaraldehid dan kitosan dikarakterisasi dengan TGA, FT-IR, SEM dan XRD. Film bioplastik ini juga ditambahkan senyawa aktif antimikroba dan antioksidan Rosemary Essential Oil (REO) untuk meningkatkan keunggulan bioplastik. Hasil penelitian menunjukkan modifikasi filmselulosa/PVA yang diikat silang dengan glutaraldehid dan penambahan filler kitosan dapat meningkatkan sifat fisik dan mekanik bioplastik, dengan konsentrasi optimum masing-masing variasi adalah 56%(b/b) dan 33%(b/b), serta terbukti dapat meningkatkan keunggulan bioplastik karena memiliki aktivitas antimikroba dan antioksidan
<hr>A large number of conventional plastic use causes an accumulation of plastic waste, causing environmental problems. Cellulose-based biodegradable plastics can be used as an alternative to conventional plastics, because they are environmentally friendly, easy to obtain, and easily degraded. However, the use of cellulose as a bioplastic base material requires physical or chemical modifications to improve it is physical and mechanical properties. In this study, improvement of physical and mechanical properties of cellulose-based bioplastics was carried out by adding PVA and using glutaraldehyde crosslinking agent and chitosan filler. Optimization of cellulose/PVA films synthesis was done with a series concentration of glutaraldehyde and chitosan, 0-56% and 0-33% (w/w) respectively. The results of bioplastic film synthesis were evaluated for thickness, swelling and solubility, biodegradability and mechanical properties, the optimum concentration of each variation of glutaraldehyde and chitosan was characterized by TGA, FT-IR, SEM, and XRD. Bioplastic films were also added to the antimicrobial and antioxidant properties of Rosemary Essential Oil (REO) to increase the superiority of bioplastics. The results showed that the modification of the cellulose/PVA film crosslinked with glutaraldehyde and the addition of chitosan filler improve the physical and mechanical properties of bioplastic, with the optimum concentration of each variation being 56% (w/w) and 33% (w/w). The addition of Rosemary Essential Oil has been proven can increase the capability of bioplastics because of antimicrobial and antioxidant activity.