Studi efek dari blowing agent metilen klorida dan chain extender pati pada sifat fisika, mekanik, dan termal dari busa bio-poliuretan = Study on the effects of methylene chloride blowing agent and starch chain extender to physical, mechanical, and thermal properties of bio-polyurethane foam

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Abstrak

Proses sintesis busa bio poliuretan berbasis pati dilakukan dengan menggunakan metode one shot method. Bahan dasar yang digunakan dalam sintesis busa bio poliuretan adalah poliol berupa Polipropilen Glikol (PPG) 2000 dan diisosianat berupa 'Toluene Diisocyanate' 80 (TDI 80). Persentase penambahan pati sebanyak 1, 2, dan 3 pbw, beserta penambahan Metilen Klorida sebanyak 7, 8, 9 pbw menjadi variabel bebas dari penelitian ini. Hasil yang diperoleh menunjukkan bahwa penambahan pati dan Metilen Klorida dapat membentuk struktur sel yang terbuka. Hasil percobaan DSC dan TGA menunjukan Penambahan pati sebagai 'chain extender' menambah nilai temperatur transisi gelas (Tg), dari 165ºC ke 179.38ºC. Penambahan pati menaikkan nilai 'tensile strength', sementara penambahan Metilen Klorida menurunkan nilai 'tensile strength'. Penambahan pati menurunkan nilai elongasi, sementara penambahan Metilen Klorida menaikkan nilai elongasi. Penambahan pati menurunkan nilai 'airflow', sementara penambahan Metilen Klorida menaikkan nilai.

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The synthesis process of starch-based bio polyurethane foam was carried out using the one shot method. The basic materials used in the synthesis of bio-polyurethane foam are Polypropylene Glycol (PPG) 2000 as polyol and Toluene Diisocyanate 80 (TDI 80) as diisocyanate. The starch additions of 1, 2, and 3 pbw and Methylene Chloride additions of 7, 8, 9 pbw became the independent variables to study the change in mechanical properties. Bio-PU foam sample was also compared to virgin PU sample without the addition of starch to study the effects of starch as chain extender to foam morphology and thermal properties. The results obtained indicate that the addition of Methylene Chloride as physical blowing agent and starch as chain extender forms opened celled bio-PU foam. The addition of starch as chain extender increases glass transition temperature, from 165ºC (sample without starch) to 179.38ºC. The addition of starch increases tensile strength, while the addition of Methylene Chloride decreases tensile strength. The addition of starch decreases elongation, while the addition of Methylene Chloride increases elongation. The addition of starch decreases air flow, while the addition of Methylene Chloride increases air flow.