

Pengaruh Penambahan Plasticizer Terhadap Maleabilitas Pelat Fiksasi Fraktur Kraniomaksilofasial Berbasis Polilaktida (PLA) = Effect of Plasticizer on Maleability of Polylactide-Based Craniomaxillofacial Fracture Fixation Plates

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Abstrak

Pada penelitian ini dipelajari pengaruh penambahan plasticizer pada maleabilitas pelat implan berbasis PLA untuk aplikasi fraktur tulang kraniomaksilofasial. Spesimen disintesis dengan menambahkan plasticizer dengan konsentrasi 2% pada campuran PLLA dan PDLLA (70:30). Proses pencampuran dilakukan dengan rheomixing dan pencetakan spesimen dengan oven vakum. Spesimen dikarakterisasi untuk mengetahui sifat-sifatnya. Penambahan plasticizer gliserol, castor oil dan PEG 400 memberikan pengaruh terhadap pergeseran nilai absorbansi spektrum infra merah. Selain itu, nilai temperatur transisi gelas (Tg) juga mengalami penurunan dari 62,3oC menjadi 58,5oC. Penambahan plasticizer juga menurunkan nilai kekuatan tekuk, regangan tekuk, dan modulus elastisitas spesimen. Hasil evaluasi analisis mikrostruktur menunjukkan bahwa campuran bersifat miscibel. Hasil pengujian degradasi menunjukkan bahwa spesimen 30PDLLA/gliserol mengalami proses degradasi dengan nilai penurunan terkecil.

.....In this study, the effect of plasticization to the maleability of polilactide-based implant plate in craniomaxillofacial bone fracture application was studied. Specimens were synthesized by adding a plasticizer with a concentration of 2 %wt in a mixture of PLLA and PDLLA (70:30). The mixing process was carried out by rheomixing, and the forming process was utilized a vacuum oven. Specimens were characterized to determine their properties. The addition of glycerol plasticizer, PEG 400, and castor oil has an effect on the shift in the absorbance value of the infrared spectra. In addition, the value of the glass transition temperature (Tg) also decreased from 62.3oC to 58.5oC. The addition of plasticizer also reduces the bending strength, bending strain, and modulus of elasticity of the specimens. The evaluation of the microstructural analysis showed that the mixture was miscible. The results of the degradation test showed that the plasticized specimen 30PDLLA/glycerol underwent a degradation process with the smallest portion.