

ABSTRAK

PENGARUH PENAMBAHAN *POLYPROPYLENE* SEBAGAI SUBSTITUSI PASIR PADA PEMBUATAN MORTAR POLIMER DENGAN WAKTU PERENDAMAN 7 HARI DAN 14 HARI

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Pengambilan pasir secara terus menerus dapat mengakibatkan kerusakan lingkungan. Limbah plastik jenis *polypropylene* merupakan limbah plastik terbanyak dengan total sekitar 2,03% dari 9,52 juta ton sampah plastik di Indonesia. Salah satu alternatif yang dapat digunakan yaitu mengganti pasir dengan *polypropylene*, karena sifat *polypropylene* yang ringan, tahan korosi, dan relatif murah, serta dapat meningkatkan kekuatan mekanik. Tujuan dari penelitian ini yaitu untuk mengetahui pengaruh penambahan *polypropylene* sebagai substitusi pasir pada pembuatan mortar polimer. Variasi proporsi *polypropylene* terdiri dari 0%, 5%, 7,5%, 10%, 12,5%, dan 15% terhadap volume pasir. Mortar polimer dicetak dengan ukuran $5 \times 5 \times 5 \text{ cm}^3$, direndam selama 7 hari dan 14 hari. Setelah itu dilakukan pengujian fisis (massa jenis, porositas, dan absorpsi) dan mekanis, serta karakterisasi *X-Ray Fluorescence*, *X-Ray Diffraction*, *Scanning Electron Microscopy- Energy Dispersive Spectroscopy*, dan *Fourier Transform Infra-Red*. Berdasarkan hasil penelitian didapatkan kuat tekan optimal pada penambahan 5% *polypropylene* terhadap volume pasir yaitu sebesar 5,4 MPa, massa jenis sebesar $1,49 \text{ g/cm}^3$, porositas sebesar 6,00%, dan absorpsi sebesar 4,01%. Hasil uji XRF yang dihasilkan 40,65% CaO, 39,82% SiO₂, 7,06% Al₂O₃ dengan fasa dominan *calcite*, *quartz*, dan *calcium silicate*. Hasil EDS yaitu mengandung unsur O, C, Si, Ca, Al, K, Nb, Fe, dan Na, unsur yang paling mendominasi yaitu Ca dan Si. Hasil FTIR menunjukkan adanya gugus C-O, C-H, dan Si-OH. Mortar ini termasuk kedalam mortar jenis N yang tergolong ringan dan diperuntukan sebagai kontruksi dinding.

Kata kunci: mortar polimer, uji mekanis, uji fisis, *polypropylene*

ABSTRACT

EFFECT OF POLYPROPYLENE ADDITION AS SAND SUBSTITUTION IN THE MANUFACTURE OF POLYMER MORTAR WITH SOAKING TIME OF 7 DAYS AND 14 DAYS

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Continuous sand extraction can cause environmental damage. Polypropylene plastic waste is the largest plastic waste with a total of about 2,03% of the 9,52 million tonnes of plastic waste in Indonesia. One alternative that can be used is to replace sand with polypropylene, because the properties of polypropylene are lightweight, corrosion resistant, and relatively cheap, and can increase mechanical strength. The purpose of this study was to determine the effect of the addition of polypropylene as a substitute for sand in the manufacture of polymer mortar. The variation of polypropylene proportion consists of 0%, 5%, 7,5%, 10%, 12,5%, and 15% to the volume of sand. Polymer mortars were moulded with a size of $5 \times 5 \times 5 \text{ cm}^3$, soaked for 7 days and 14 days. Afterwards, physical (density, porosity, and absorption) and mechanical tests were conducted, as well as X-Ray Fluorescence, X-Ray Diffraction, Scanning Electron Microscopy-Energy Dispersive Spectroscopy, and Fourier Transform Infra-Red characterisation. Based on the research results, the optimal compressive strength was obtained at the addition of 5% polypropylene to the volume of sand which was 5,4 MPa, density of $1,49 \text{ g/cm}^3$, porosity of 6,00%, and absorption of 4,01%. XRF test results produced 40,65% CaO, 39,82% SiO₂, 7,06% Al₂O₃ with dominant phases of calcite, quartz, and calcium silicate. EDS results contain elements of O, C, Si, Ca, Al, K, Nb, Fe, and Na, the most dominating elements are Ca and Si. FTIR results show the presence of C-O, C-H, and Si-OH groups. This mortar is included in the type N mortar which is classified as lightweight and intended as wall construction.

Keywords: *polymer mortar, mechanical test, physical test, polypropylene*