ABSTRAK

PENGARUH VARIASI KOMPOSISI DAN WAKTU PERENDAMAN TERHADAP KARAKTERISTIK MORTAR DENGAN PENAMBAHAN *FIBERGLASS* DAN LIMBAH *STYROFOAM* (*POLYSTYRENE*)

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Telah dilakukan penelitian pengaruh variasi komposisi dan waktu perendaman terhadap karakteristik mortar dengan penambahan *fiberglass* dan limbah *styrofoam* (*polystyrene*) yang bertujuan untuk menentukan komposisi pembuatan mortar polimer yang optimal terhadap kuat tekan. Mortar polimer dibuat dengan mencampurkan *fiberglass* dan *styrofoam* sebagai bahan pengisi pengganti pasir dengan variasi (0, 2.5, 5, 7.5, 10, dan 12.5) *wt*% dari total berat mortar. Campuran tersebut dicetak dalam bentuk kubus berdimensi 5 x 5 x 5 cm^3 dan direndam selama 14 dan 21 hari. Sampel mortar polimer dengan kode PM 5%-14D dan PM 5%-21D menunjukkan nilai kuat tekan tertinggi, yaitu 2,65 MPa dan 4,96 MPa. Peningkatan kuat tekan ini disebabkan oleh penurunan pori dan peningkatan kerapatan struktur pada mortar polimer. Sampel tersebut kemudian dikarakterisasi menggunakan XRF, XRD, FTIR dan SEM-EDS. Hasil XRF menunjukkan dominasi senyawa CaO dan SiO_2, yang berkontribusi terhadap kekuatan struktur mortar. Hasil XRD mengidentifikasi fase utama sebagai *calcite* ($CaCO_3$) pada 2θ = 29,40° setelah 14 hari perendaman dan pada 2θ = 29,41° setelah 21 hari perendaman. Hasil FTIR mengidentifikasi ikatan hidroksil (-OH), C-S-H, Si-O, dan Si-O-Si mengindikasikan interaksi kimia yang stabil dalam mortar polimer. Hasil SEM-EDS menunjukkan penurunan jumlah pori dan peningkatan kerapatan struktur seiring bertambahnya waktu perendaman.

Kata Kunci: *fiberglass*, *styrofoam*, mortar polimer, XRF, XRD, FTIR, SEM-EDS.

ABSTRACT

EFFECT OF COMPOSITION VARIATION AND SOAKING TIME ON MORTAR CHARACTERISTICS WITH *FIBERGLASS* AND *STYROFOAM* (POLYSTYRENE) WASTE ADDITION

By

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A research was conducted to investigate the effect of composition variation and soaking time on the characteristics of mortar with the addition of *fiberglass* and *styrofoam* (polystyrene) waste. The goal was to determine the optimal polymer composition for improving of compressive strength. Polymer mortars were prepared by mixing *fiberglass* and *styrofoam* as filler materials instead of sand, with variations of 0, 2.5, 5, 7.5, 10, and 12.5 *wt*% of the total mortar weight. The mixtures were molded into cubes with dimensions of 5 x 5 x 5 cm^3 and soaked for 14 and 21 days. The polymer mortar samples coded as PM 5%-14D and PM 5%-21D exhibited the highest compressive strength values of 2.65 MPa and 4.96 MPa, respectively. This increase in compressive strength was attributed to the reduction in pore size and the enhancement in structural density of the polymer mortar. The samples were characterized using XRF, XRD, FTIR, and SEM-EDS. XRF results revealed the dominance of CaO and SiO_2 compounds, contributing to the mortar's structural strength. XRD identified the main phases as *calcite* ($CaCO_3$) at $2\theta = 29.40°$ after 14 days of immersion and at $2\theta = 29.41°$ after 21 days of immersion. FTIR results detected hydroxyl (-OH), C-H, Si-O, and Si-O-Si suggesting stable chemical interactions within the polymer mortar. SEM-EDS results showed a decrease in pore number and an increase in structural density with prolonged immersion time.

Keywords: *fiberglass*, *styrofoam*, polymer mortar, XRF, XRD, FTIR, SEM-EDS.