Pengaruh Rasio Arang Tempurung Kelapa dengan Abu Terbang dan Suhu Pelarutan Alkali Aktivator terhadap Kuat Tekan Geopolimer serta Karakteristik Pendukungnya = Effect of Coconut Shell Char to Fly Ash Ratio and Dissolving Temperature of Alkali Activator on Compressive Strength of Geopolymers and Their Supporting Characteristics

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Abstrak

Pada penelitian ini, pembentukan geopolimer divariasikan rasio arang tempurung kelapa terhadap abu terbang sebagai sumber aluminasilikat sebesar 0%, 5%, 10%, dan 15%. Sumber aluminasilikat yang divariasikan kemudian dicampur dengan larutan alkali aktivator yang berupa NaOH dan water glass dengan berbagai suhu yaitu, 30oC (suhu ruang), 40oC, dan 50oC. Karakterisasi yang akan diujikan berupa analisis kuat tekan, analisis komposisi XRF, analisis kristalinitas XRD, dan analisis gugus fungsi FTIR. Kuat tekan terbaik yang dihasilkan bernilai 21,34 MPa dengan rasio bahan baku 85% abu terbang dan 15% arang tempurung kelapa, yang melalui proses pencampuran alkali aktivator pada suhu 40oC. Nilai tersebut lebih tinggi dari sampel semen Portland sebagai sampel kontrolnya yang bernilai 19,42 MPa. Dalam variasi rasio arang tempurung kelapanya, nilai kuat tekan tersebut naik 48% dibanding variasi tanpa arang tempurung kelapa. Sementara dalam variasi suhu pelarutan alkalinya, nilai kuat tekan naik 62% dari pelarutan pada suhu ruang. Hasil analisis XRF menunjukan adanya peningkatan kadar Si dan Al pada sampel geopolimer dibanding bahan bakunya. Hail analisis XRD menunjukan adanya mineral pargasite, kuarsa, girolit, dan biotit pada geopolimer. Sementara hasil analisis FTIR menunjukkan adanya ikatan Si-O/Al-O pada bilangan gelombang 1399,69 dan ikatan Si-O-Si pada bilangan gelombang 1078,67

.....In this study, the ratio of coconut shell ash to fly ash as a source of aluminasilicate was varied by 0%, 5%, 10%, and 15%. The various aluminasilicate sources were then mixed with an alkaline activator solution in the form of NaOH and water glass at various temperatures, such as 30oC (room temperature), 40oC and 50oC. The characterization that will be tested is in the form of compressive strength analysis, composition analysis of XRF, crystallinity analysis of XRD, and functional groups analysis of FTIR. The best compressive strength is 21.34 MPa with a ratio of 85% fly ash and 15% coconut shell ash, which is mixed with an alkaline activator at 40oC. This value is higher than the Portland cement sample as the control sample which is 19.42 MPa. In the variation of the coconut shell ash ratio, the compressive strength value increased by 48% compared to the variation without coconut shell ash. Meanwhile, with variations in the temperature of the alkaline dissolving, the compressive strength increased by 62% from dissolution at room temperature. The results of the XRF analysis showed an increase in Si and Al levels in the geopolymer samples compared to the raw materials. The results of the XRD analysis showed the presence of pargasite, quartz, gyrolite and biotite minerals in the geopolymer. While the results of FTIR analysis showed the presence of Si-O/Al-O bonds at wave number 1399.69 and Si-O-Si bonds at wave number 1078.67.