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Pengaruh Substitusi Cementitious Material Flyash, Trass dan Limestone dalam Semen Portland terhadap Mekanisme Reaksi Hidrasi

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Abstrak

Telah dilakukan subtitusi 21% ’cementitious material’ flyash, trass dan limestone pada semen portland. Komposisi 75.5% clinker semen portland, 3.5% gips, 7% limestone dan 14 % variasi komposisi trass-flyash digiling bersama menghasilkan semen yang disebut semen portland komposit. Mekanisme hidrasi dan evolusi mikrostruktur pasta semen yang mengeras diamati pada umur 1,3,7,28 dan 56 hari dibandingkankan dengan semen Portland menggunakan metoda XRD dan SEM. Kalsium silikat hidrat, CSH sebagai fasa utama produk hidrasi semen portland diidentifikasi dengan pembentukan fasa Ca(OH)2. Dan reaksi posolanik flyash-trass pada semen portland komposit diidentifikasi melalui penurunan fraksi fasa Ca(OH)2. Morfologi CSH berupa serat berbentuk jarum diamati pada tiap umur hidrasi. Diperoleh hasil bahwa reaksi posolanik antara silika amorf pada trass dan flyash baru berlangsung setelah 7 hari sehingga kuat tekan mortar pada umur awal diperoleh hanya dari CSH hasil reaksi hidrasi semen portland.
.....Substitution of 21% cementitious material flyash, trass and limestone in portland cement were carried out. Proportion of 75.5% Portland cement clinker, 3.5% gypsum, 7% limestone and 14% variation of trass-flyash were ground together and classified as Portland Composite Cement. Hydration mechanism and microstructure evolution of hardened paste at age of 1, 3, 7, 28 and 56 days were observed by XRD and SEM. Calcium Silicate Hydrate as main hydration products of Portland cement was identified by Ca(OH)2 formation and pozzolanic reaction by decreasing of Ca(OH)2 phase fraction. CSH as needle like fiber in the paste were identified in each age of hydration. Results showed that pozzolanic reaction of amorphous silica in trass and flyash just started to react after 7 days so that the early strength comes only from CSH of portland cement hydration.