ABSTRAK

PENGARUH VARIASI KOMPOSISI DAN POLIURETAN TERHADAP PEMBENTUKAN *CELLULAR GLASS CERAMIC* BERBASIS *BASALT* DAN *SLAG BOILER* MELALUI METODE *DIRECT FOAMING*

Oleh

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Telah dilakukan penelitian sebagai upaya peningkatan nilai tambah limbah padat industri menjadi produk *cellular glass ceramic* berupa batu *basalt* dan *slag boiler*. Penelitian ini menggunakan variasi komposisi *basalt*:*slag boiler* sebesar 90:10%, 80:20%, 70:30%, 60:40%, dan 50:50%. Kemudian variasi poliuretan yang digunakan sebesar 30%,40%, dan 50% sebagai *foaming agent* dengan pemanasan sampai suhu 950°C dengan penahanan pada suhu 400°C dan 700°C selama 2 jam dengan pendinginan di dalam tungku. Berdasarkan hasil karakterisasi dan uji mekanis serta fisis pada sampel didapatkan hasil yang cukup baik. Pada sampel didominasi SiO_2, Fe_2O_3, CaO dan Al_2O_3 yang cukup tinggi dengan fase kristal yang cukup banyak terbentuk yakni quartz dan augite, yang memiliki ukuran pori sebesar ukuran $\leq$ 1 mm sekitar 85% dan $>$ 1 mm sekitar 15%. Nilai kuat tekan densitas, dan porositas terbaik berturut- turut sebesar 8,68 MPa; 1,14 g/cm^3; dan 13,55%.

Kata Kunci: *cellular glass ceramic*, *basalt*, *slag boiler*, *foaming agent*, poliuretan

ABSTRACT

THE EFFECT OF COMPOSITION AND POLYURETANE VARIATIONS ON THE FORMATION OF CELLULAR CERAMIC BASED ON BASALT AND SLAG BOILER THROUGH DIRECT FOAMING METHOD

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Research has been carried out as an effort to increase the added value of industrial solid waste into cellular glass ceramic products in the form of basalt stone and boiler slag. This research uses variations in basalt:slag boiler composition of 90:10%, 80:20%, 70:30%, 60:40%, and 50:50%. Then the polyurethane variations used were 30%, 40%, and 50% as a foaming agent by heating to a temperature of 950°C with holding at a temperature of 400°C and 700°C for 2 hours with cooling in a furnace. Based on the results of characterization and mechanical and physical tests on the samples, quite good results were obtained. The samples are dominated by SiO_2, Fe_2O_3, CaO and Al_2O_3 which are quite high with quite a lot of crystal phases formed, namely quartz and augite, which have pore sizes of ≤1 mm, around 85% and >1 mm, around 15%. The best compressive strength, density and porosity values respectively were 8.68 MPa; 1.14 g/cm^3; and 13.55%.

Keywords: *cellular glass ceramic, basalt, boiler slag, foaming agent, polyurethane*