

ABSTRAK

Luli Warti Sihombing, NIM 4202640001 (2020). Pengaruh Senyawa Borat Terhadap Sifat Fisis Dan Struktur Medium Gelas Berbasis Pasir Kuarsa “Huta Ginjang”

Telah dilakukan penelitian pengaruh senyawa borat oksida terhadap sifat fisis dan struktur medium gelas berbasis pasir kuarsa “Huta Ginjang”. Indonesia yang kaya akan bahan alam dapat dijadikan bahan industri seperti pasir kuarsa. Pasir kuarsa dapat ditemukan di berbagai daerah salah satunya di Huta Ginjang yang terletak daerah Tapanuli Utara provinsi Sumatera Utara. Pasir kuarsa tersebut dapat dijadikan sebagai industri pembuatan gelas. Permasalahan dan kelemahan medium gelas saat ini diantaranya adalah struktur komposisi gelas yang tidak homogen sehingga menyebabkan efek hamburan cahaya yang kurang tahan pada panas tinggi menyebabkan turunnya intensitas emisi dari medium gelas. Komposisi senyawa (x) pasir kuarsa + (60-x) B₂O₃ + 10BaO + 30Na₂O dimana x= 0; 2.5; 5; 10; 15:20 (mol%). Semua senyawa berbentuk serbuk dengan total massa 15gram dengan menggunakan teknik *melt-quenching* pada suhu 1300 °C selama 3 jam. Mengetahui kualitas dari material gelas, maka dilakukan pengukuran dan perhitungan terhadap sifat fisis gelas antara lain massa molekul, volume molar, kerapatan, indeks bias, konstanta dielektrik, *reflection loss*, dan *refractive molar*. Nilai dari massa molar, kerapatan, indeks bias, konstanta dielektrik, dan *reflection loss* pada sampel meningkat secara perlahan sesuai dengan kenaikan konsentrasi pasir kuarsa sedangkan pada volume molar perlahan menurun dan pada *refractive molar* mengalami penurunan namun pada sampel ke tiga hingga ke enam mengalami kenaikan. Karakteristik yang dilakukan untuk mengetahui struktur dari gelas menggunakan XRD dan FTIR. Hasil XRD menunjukkan struktur gelas dengan menambahkan pasir kuarsa merupakan amorf. Terdapat 4 puncak posisi spektrum FTIR pada gelas borat dimana terletak pada daerah serapan 822 cm⁻¹, 950cm⁻¹, 1335 cm⁻¹, dan 1665 cm⁻¹ dari panjang gelombang 700-4000 cm⁻¹. Material gelas spektrum absorpsi serapan cahaya pada panjang gelombang 350-1100 nm.

Kata Kunci: *Medium Gelas, Pasir Kuarsa, Sifat Fisis, Struktur, Borat Oksida.*



ABSTRACT

Luli Warti Sihombing, NIM 4202640001 (2020). Effect of Borate Compound on Physical Properties Physical Properties and Structure of Quartz Sand Based Glass Medium "Huta Ginjang"

Research has been conducted on the effect of borate oxide compounds on the physical properties and structure of glass medium based on "Huta Ginjang" quartz sand. Indonesia is rich in natural materials that can be used as industrial materials such as quartz sand. Quartz sand can be found in various regions, one of which is in Huta Ginjang which is located in the North Tapanuli area of North Sumatra province. The quartz pair can be used as a glass making industry. The problems and weaknesses of the current glass medium include the inhomogeneous structure of the glass composition which causes a light scattering effect that is less resistant to high heat causing a decrease in the emission intensity of the glass medium. Compound composition of (x) quartz sand + (60-x) B₂O₃ + 10BaO + 30Na₂O where x = 0; 2.5; 5; 10; 15; 20 (mol%). All compounds are in powder form with a total mass of 15grams using melt-quenching technique at 1300°C for 3 hours. Knowing the quality of the glass material, measurements and calculations were made on the physical properties of the glass including molecular mass, molar volume, density, refractive index, dielectric constant, reflection loss, and molar refractive. The values of molar mass, density, refractive index, dielectric constant, and reflection loss in the samples increased slowly according to the increase in quartz sand concentration while the molar volume slowly decreased and the refractive molar decreased but in the third to sixth samples experienced an increase. Characterization is done to determine the structure of the glass using XRD and FTIR. XRD results show the structure of the glass by adding quartz sand is amorphous. There are 4 peak positions of the FTIR spectrum on borate glass which are located in the absorption regions of 822 cm⁻¹, 950cm⁻¹, 1335 cm⁻¹, and 1665 cm⁻¹ from the wavelength of 700-4000 cm⁻¹. The glass material has a light absorption spectrum at a wavelength of 350-1100 nm.

Keywords: *Glass Medium, Quartz Sand, Physical Properties, Structure, Boric Oxide.*

