

SINTESIS DAN KARAKTERISASI BUSA POLIURETAN BERBASIS POLIETER SEBAGAI BUSA PEMBERSIH PIPA MINYAK DAN GAS

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INTISARI

Penelitian ini bertujuan untuk mensintesis dan mendapatkan formulasi senyawa poliuretan menggunakan polieter dan metilen difenil diisosianat. Senyawa hasil sintesis kemudian diuji aktivasi busa PIG berupa kekerasan, kekuatan tarik, perpanjangan saat putus, dan densitas. Sintesis senyawa poliuretan dilakukan dengan mereaksikan polieter dengan katalis, surfaktan, *chain extender*, dan air. Reaksi berjalan menggunakan metode pengadukan selama 1 menit pada suhu ruang. Metilen difenil diisosianat kemudian ditambahkan ke campuran dan dilakukan pengadukan kembali selama 20 detik pada suhu ruang. Senyawa dituang ke dalam cetakan terbuka dan tertutup dan didiamkan selama 1 hari. Senyawa hasil sintesis dilakukan karakterisasi menggunakan beberapa instrument yakni FTIR, XRD, dan SEM. Uji aktivitas busa PIG dari hasil sintesis dilakukan uji sifat mekanik berupa kekerasan, kekuatan tarik, perpanjangan saat putus, dan densitas.

Sintesis poliuretan menghasilkan produk dengan warna putih kekuningan dengan morfologi sel terbuka. Senyawa poliuretan telah berhasil disintesis dengan formula perbandingan massa antara polieter : isosianat : aditif sebesar 13 : 10 : 2. Hasil pengujian poliuretan sebagai busa PIG dengan variasi B8715C menunjukkan performa terbaik dengan hasil kekerasan Shore D sebesar 19,6, kekuatan tarik sebesar 2,15 MPa, perpanjangan saat putus sebesar 18,77 %, dan densitas sebesar 131 kg/m^3 . Berdasarkan hasil tersebut, maka poliuretan yang dihasilkan digolongkan ke dalam busa fleksibel.

Kata kunci: Busa PIG, metilen difenil diisosianat, polieter, poliuretan.

SYNTHESIS AND CHARACTERIZATION OF POLYETHER-BASED POLYURETHANE FOAM AS A PIPE-CLEANING FOAM FOR THE OIL AND GAS INDUSTRY

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ABSTRACT

This research aims to synthesize and develop formulations of polyurethane compounds using polyether and methylene diphenyl diisocyanate. The synthesized compounds were then tested for foam properties such as hardness, tensile strength, elongation at break, and density. The synthesis of the polyurethane compounds was carried out by reacting polyether with a catalyst, surfactant, chain extender, and water. The reaction was conducted using a stirring method for 1 minute at room temperature. Methylene diphenyl diisocyanate was then added to the mixture and stirred again for 20 second at room temperature. The compound was poured into open and closed molds and allowed to cure for 1 day. The synthesized compound was characterized using several instruments, namely FTIR, XRD, and SEM. The foam properties of the synthesized material were tested for mechanical properties, including hardness, tensile strength, elongation at break, and density.

The polyurethane synthesis produced a product with a yellowish-white color and an open-cell morphology. The polyurethane compound has been successfully synthesized with a mass ratio of polyether : isocyanate : additive of 13 : 10 : 2. The results of testing of the polyurethane as pig foam with the B8715C variant showed the best performance, with a hardness Shore D of 19.6, tensile strength of 2.15 MPa, elongation at break of 18.77%, and density of 131 kg/m³. Based on these results, the resulting polyurethane is classified as a flexible foam.

Keywords: Methylene diphenyl diisocyanate, pig foam, polyether, polyurethane.