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SYNTHESIS OF HIGHLY POROUS POLYHIPE MATERIALS AND REMOVING PETROLEUM WASTES

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High Internal Phase Emulsion (HIPE) is a water in oil emulsion that obtained by highly dispersing aqueous phase in oil phase. The main part of HIPE emulsion is oil phase that consists of monomers, cross-linking agent at low concentration, surface active materials, initiators and stabilizers which are soluble in oil. And the internal phase is water which occupies more than 74 % of the total emulsion volume and this ratio can be increased to 99 %. After the polymerisation, removing the internal phase leaves highly porous, open-cell, cross-linked and low density polymer monolith. polyHIPE materials which are obtained by this process are used to remove and recuperate toxic gasses, organic liquids (petroleum etc.) and heavy metals.

In this study, highly porous and cross-linked polyester based polymeric materials were synthesised by using HIPE method. The emulsions were prepared by using unsaturated polyester resin, cross-linking monomer, initiator and emulsifier. Internal phase ratios of these polyHIPE materials were changed between 85 % and 95 %. To determine the effect of initiator and emulsifier, the type and concentration of the initiator and emulsifier were changed. As a result of these studies the most suitable initiator and emulsifier type and concentration were detected. And then the effect of stirring rate and time on porosity of polyHIPE materials were investigated. Their pore structures were observed by SEM (Scanning Electron Microscope). With the intention of removing petroleum wastes from environment, we investigated swelling properties of these materials in hexane, heptane, pentane, benzene and benzene. At the end of these studies, the most efficient polyHIPE material that used to remove petroleum wastes was investigated. And the results were compared with the literature values.