



Impregnation of liquid natural rubber (LNR) foam with activated carbon for enhancing oil removal from water

Azwan Mat Lazim^{a,*}, M. Hilman^a, S. Saroni^a, N. Muslihuddin^a, A. Kamil^a, A.A. Rahman^a, A. Hafidz Yusoff^b, Mazlan Mohamed^b, N. Haida M. Kaus, Ekwipoo Kalkornsurapranee^c

^aSchool of Chemical Sciences, Faculty of Science and Technology, The National University of Malaysia, 43600 UKM Bangi, Selangor, Malaysia, emails: azwanlazim@ukm.edu.my (A.M. Lazim), muhdhilman12@yahoo.com (M. Hilman)

^bFaculty of Bioengineering and Technology, Universiti Malaysia Kelantan, 17600 Jeli, Kelantan, Malaysia, emails: hafidz.y@umk.edu.my (A. Hafidz Yusoff), mazlan.m@umk.edu.my (M. Mohamed)

^cSchool of Chemical Sciences, Universiti Sains Malaysia, 11800, Pulau Pinang, Malaysia, email: ekwipoo@gmail.com (E. Kalkornsurapranee)

^dDepartment of Materials Science and Technology, Faculty of Science, Prince of Songkla University, Hat-Yai, Thailand erifsyarifudin@gmail.com, nikmus94@gmail.com, akhsan199@gmail.com, amir950213@gmail.com, noorhaida@usm.my

Received 6 June 2019; Accepted 22 December 2019

ABSTRACT

Macroporous rubber foam made of liquid natural rubber (LNR) was fabricated at ambient temperature by using sodium bicarbonate (NaHCO_3) as foaming agent and S_2Cl_2 as crosslinker. Activated carbon was added through blending process to enhance oil sorption performance. The scanning electron microscopy morphology analysis showed that the LNR-foam has produced pores with diameter sizes between 50 and 150 μm whilst porosity volume was in range of 5.5–6.5 mol/cm^3 . The swelling properties of this porous LNR-foam incorporated with activated carbon and their application as various oil types (petrol A, petrol B, diesel, olive, kerosene and engine oil) were evaluated. Result showed that absorption capacity was totally depending on the viscosity of oil. At optimum crosslinker concentration (6.5 w/w %), petrol A has been absorbed up to 5.47 g g^{-1} while olive oil approximately 1.00 g g^{-1} . The LNR-foams are able to be re-used up to 20 absorption cycles which indicates them as good reusability material. Therefore, this natural based foam is highly potential to be used as alternative absorbent that are readily available.

Keywords: Macroporous; Foam; Activated carbon; Rubber; Oil spill

* Corresponding author.