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Natural rubber/ scrap rubber and 4-tert-butylstyrene/isodecyl acrylate semi-IPN systems as novel oil absorbents

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Need of an excellent oil-absorbent is indispensable for todays' world for oil spill cleanup as it has become a prominent environmental pollution pathway. This research highlights the use of a novel semi-Inter Penetrating Polymer Network (IPN) polymeric materials based on natural rubber (NR)/ scrap rubber (SR) with 4-tert-butylstyrene (tBS) / isodecyl acrylate (IDA) as a sorbent for an oil spill cleanup. In this research divinylbenzene (DVB) was used as a cross-linking agent and benzoyl peroxide (BPO) was used as an initiator. A series of IPN systems was synthesized and oil absorbency and oil retention capacity in toluene and four different oils (diesel, petrol, automobile discard oil and coconut oil) were determined. Highest Oil absorbency values for synthesized semi IPN systems are shown in Table 1.

Table 1: The highest oil absorbency values of semi IPN systems

Semi IPN system	Absorbency percentage (w/w *100)
NR:4-tBS:DVB (50:50:1)	1051.0% in toluene , 543.0% in diesel
NR:4-tBS:DVB (50:50:4)	241.9% in toluene , 375.9% in diesel
SR:4-tBS:DVB (30:70:4)	266.0% in coconut oil
SR:4-tBS:DVB (30:70:1)	58.9% in coconut oil
SR:4-tBS:DVB (10:90:4)	112.7% in toluene
SR: IDA : DVB (10:90:4)	287.1% in toluene

Oil absorbency decreased with increasing DVB concentration and increased with the amount of NR. Oil absorbency increased with increasing soaking time while the rate of oil sorption decreased. NR is efficient in absorbing light to moderately viscous oils and less effective in absorbing highly viscous oils.

Selection of NR/SR as the core polymer of the absorbent is a worthwhile endeavour as it is highly abundant in South Asia, sustainable and also economically profitable compared to the synthetic petroleum based polymers.

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