

Unsaturation dependence of Curing Rate for Butyl Rubber

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Butyl rubber has been used as a tire inner tube and shoe's outsole mainly due to lower gas permeability and higher chemical resistance. Commercially available butyl rubber typically contains 1-2% unsaturated moieties which is the point for the cross link. In industrial fields, the curing rate is one of the important factors to control productivity, and many previous studies have focused on the effect of temperature, curing agent, and fillers. In this study, the degree of unsaturation of butyl rubber was systematically controlled and the curing rate of the butyl rubber as a function of the degree of unsaturation was investigated. Three butyl rubbers with various unsaturation were synthesized using cationic polymerization, and formulated with curing agent and accelerator. Then the curing rate of the blends was measured by rotational rheometer following ASTM D 2084. We observed that the curing rate index (CRI) increases from 0.113 to 0.172 as isoprene content increases from 1.8 mol% to 8.4 mol% at constant temperature and additives ratio. Therefore, higher degree of unsaturation of butyl rubber provides faster curing rate without addition of additional boosters.