Abstract

The halogenated polyisobutylene based rubbers are used in the tire industry for production of the tire inner liners and tire sidewalls. The combination of excellent flex resistance, good heat resistance and low permeability to gases and moisture, make the these rubbers suitable for these applications. The halogenated polyisobutylene based rubbers are also used in the pharmaceutical applications. In order to further improve the ozone resistance and heat stability, a new generation of halogenated butyl rubbers having completely saturated polymer backbone, namely brominated isobutylene-co-paramethylstyrene (BIMS) has been recently developed. The new generation rubber, has a complete resistance towards ozone and oxygen. In addition, the presence of the phenyl rings enhances the UV resistance of the rubber, which reduces surface degradation and tack development during exposure to sunlight. Furthermore, functionalization via the phenyl rings permits more thermally stable cross-links in this new rubber.. These rubbers, also showed improved retention of physical properties after heat aging, lower compression set and better aged flex fatigue performance than conventional halogenated polyisobutylene-co-isoprene rubber.

The processing behavior of this new butyl rubber is not fully understood and is still under investigation. From the literature survey it is also apparent that blends of brominated polyisobutylene-co-paramethylstyrene with unsaturated rubber, i.e. natural rubber, SBR and poly butadiene, have been studied in detail but there has been no studies on its blends with EPDM rubber. These blends have been widely used in tire side wall curing bladders and conveyor belts. Also, recently it has been reported that, blends of the saturated hydrocarbon elastomers such as polyisobutylene and ethylenepropylene-diene rubber have a wide usage in the rubber industry. This is due in large part to their high chemical resistance, lightweight, low cost, high strength and low dielectric loss. Therefore, studies of the blends of BIMS and EPDM are of great practical importance.

In the present investigation, the adhesion, mill processability, rheological behavior, mechanical properties of BIMS, and its blend with EPDM rubber have been studied. Special importance has been given to study the effects of processing conditions, blending with EPDM, addition of different type of fillers, variation of filler loading and addition of oil on the mill processing behavior of BIMS.

Key Words: Tack strength, autohesive tack, adhesive tack, green strength, contact flow, interfacial diffusion, critical nip gap, mill band formation indices, front to back roll transition, processability, drop mill operation, continuous milling operation, extrudate roughness.