

## EFFECT OF SURFACE ACTIVE AGENTS ON RUBBER-FILLER INTERACTION IN SILICA-FILLED NATURAL RUBBER LATEX VULCANIZATES

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The influence of four surface active agents on rubber-filler interaction in natural rubber latex vulcanizates has been studied. The surface active agents studied are casein, polyvinyl alcohol, ammonium alginate and sodium carboxymethylcellulose. Silica-filled natural rubber latex vulcanizates were found to show better tensile properties in the presence of polyvinyl alcohol and casein. The enhancement in tensile properties is attributed to better rubber-filler interaction.

**Key words**—Surface active agent, Precipitated silica, Latex-filler interaction, Reinforcement, Crosslinks.

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### INTRODUCTION

Fillers are added to natural rubber latex in order to modify its properties and to reduce cost (Noble, 1953). In dry rubber compounding, fillers generally act as reinforcing agents but in latex they weaken the rubber films rather than improve its strength (Blackley, 1960). Some studies have already been conducted in this line and the poor rubber-filler interaction in latex vulcanizates is attributed to many factors such as insufficient distribution of fillers, non-simultaneous deposition of filler and rubber particles and the presence of protective layer of stabilizers around the rubber and filler particles in latex which prevents direct contact between them. A study was earlier conducted in styrene butadiene rubber (SBR) latex using carbon black as

filler (Dogadkin *et al.*, 1958). It was reported that casein, which is a surface active agent could improve rubber-filler interaction in SBR latex. It was suggested that casein replaced the already existing protective layer around the rubber particles in latex and the filler particles and in the process, caused better rubber-filler interaction. The increase in viscosity of the latex compound owing to the addition of casein also caused simultaneous deposition of rubber and filler particles.

In the present work we have studied the effect of four surface active agents on vulcanization, network structure and technical properties of natural rubber latex vulcanizates which contain precipitated silica as filler. The surface active agents used were casein, polyvinyl alcohol, ammonium alginate and sodium carboxymethylcellulose.