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CARBONYL HYDROSILYLATION REACTION IN POLYMER PROCESSING CONDITIONS: A NEW APPROACH FOR EVA CROSSLINKING

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Ethylene-Vinyl Acetate copolymers functionalization and crosslinking have been widely described in literature. EVA crosslinking has been studied through several types of reactions: radical reactions[1], transesterification reactions[2] or sol-gel process based upon hydrolysis-condensation reactions of alkoxysilane[3].

Recently, we developed an original way to crosslink EVA based on an addition reaction on the carbonyl groups from the acetate function. Our strategy to form these new covalent bonds on EVA is based on a hydrosilylation reaction between SiH groups of a PDMS hydride and the carbonyl groups of EVA.

The hydrosilylation catalyst used to modify carbonyl groups is triruthenium dodecacarbonyl $Ru_3(CO)_{12}$. Few works described hydrosilylation reaction on carbonyl groups but Igarashi and al.[4] reported that ruthenium catalysts, particularly $Ru_3(CO)_{12,}$ could be used for hydrosilylation of esters.

A part of our work was to demonstrate the robustness of this reaction in the EVA processing conditions and the selectivity of the chemical reactions to carry out the expected crosslinking reaction without formation of side reactions.

Specifically, our study deals with the description and the characterization of hydrosilylation reaction between PDMS hydride terminated and EVA in the presence of $Ru_3(CO)_{12}$. An approach on EVA model compounds was carried out under conditions as close as possible to those used in EVA molten state. The mechanistic aspects were investigated with multinuclear NMR (^{1}H, ^{13}C and ^{29}Si). In addition, rheological and morphological aspects of EVA/PDMS samples were elucidated after blending.