

# **Selection of Cross-linking Agent for Poly Propylene / Ethylene Propylene Diene (PP/EPDM) Blend : How cross-linking agent affect Rheo-morphology and final property profiles**

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## **ABSTRACT**

The purpose of this paper is to study experimentally and stimulate computationally the extrusion of polypropylene (PP) and its blends with ethylene-propylene diene rubber (EPDM) with using three differnt cross-linking agents, such as (i) dimethylol phenolic resin (resole type) (ii) Sulphur, and (iii) Dicumyl peroxide. The present investigation is split into two parts: (i) measurement and modeling of rheology (ii) process analysis. The studied rheological properties of polypropylene and its blends melts include viscosity, as a function of temperature and shear rate, and die swell. Chemical degradation and oxidation is a particular feature of polypropylene at elevated temperatures which results in lowering the viscosity. Rheological measurements presented in this paper involve the techniques of melt index and capillary rheometer. Experimental data have been formulated into constitutive relations of shear viscosity against shear rate and temperature, following the Power-law with exponential temperature dependence or a polynomial relation. The effects of (i) blend composition, (ii) shear rate or shear stress on melt viscosity, (iii) shear sensitivity and flow characteristics at processing shear , (iv) melt elasticity of the extrudate; and (v) dynamic cross-linking effect on the processing characteristics of the blends were studied. The mathematical modeling of the die swell is described, including elastic and Newtonian contributions. The paper also covers the material processing characteristics include total torque development, total shear energy, specific energy, specific output etc.

In the present paper we make a comparative study of three different systems and look at the influence on interfacial tension, phase morphology, phase separation and mechanical properties.

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