Preparation and characterization of coatings with tung-oil-based reactive diluents and linseed oil alkyd

Satilmis Basan, satilmisbasan@hitit.edu.tr, Ren Xiaofeng, Priyanka P. Nalawade, Mark D. Soucek. (1) Chemical Engineering, University of Hittite, Corum, Corum, Turkey (2) Polymer Engineering, University of Akron, Akron, Ohio, United States

Two kind of reactive diluents were prepared from tung oil via a Diels-Alder reaction with two different dienophiles: methacryloxypyropyl trimethoxysilane (MAS) and triallylether acrylate (TAEA). Triallylfunctionalized tung oil has been prepared by two-step reactions. In the first step, triallyl ether acrylate was prepared by esterification of pentaerithriol ally ether with acrylic acid. In the second step, the triallyl ether acrylate was reacted with tung oil via a Diels-Alder reaction. Linseed oil alkyd resin was prepared by the monoglyceride process. The modified alkyds and diluents were characterized by ¹H NMR, ¹³C NMR and MALDI-TOF MS. The reactive diluents were mixed with linseed oil alkyd, a metal drier package and a wetting agent and then cured. Formulations were prepared as a function of reactive diluents. Tensile, thermomechanical and coating properties were evaluated after curing the films. The addition of two reactive diluents, MASTO and TAEATO, improved the tensile stress and tensile modulus of the alkyd. The addition of the diluents, however, did not significantly change the extension at break. Also, the addition of MASTO firstly increased crosslinking density and storage modulus of the alkyd up to 20wt% and after that decreased with the amount of MASTO. On the contrary, the addition of TAEATO firstly decreased crosslinking density and storage modulus of the alkyd up to 20wt% and after that decreased with the amount of TAEATO. Basic film properties including hardness, impact resistance, adhesion and gloss were not adversely affected by the introduction of any of the tung oil based diluents.