

Abstract No: MO-07

Improving shelf life of commercial borate-glycol based wood preservatives

H. I. S. I. Nandasiri* and R. C. L. De Silva

Department of Chemistry, University of Kelaniya, Sri Lanka
*supuninandasiri@gmail.com

Borates as wood preservatives have played an ever increasing role in preservation of wood against wood destroying insects and made them particularly attractive in today's environmentally conscious market. But the precipitation of borates on storage in borate-glycol wood preservatives has largely limited their demand in the current wood preservative market. The main objective of this study was focused on the possibility of reducing the borate precipitation in order to expand the shelf life of these wood preservatives. A number of strategies were employed to lessen the precipitation of borates such as changing the solvent, boron concentration and boric acid to borax ratio. Different wood preservative formulations were prepared using monoethylene glycol (MEG) and monopropylene glycol (MPG) with varying boron percentages (10% -20%) and boric acid to borax ratio. Boron percentage in each formulation was determined by the titration method over six weeks and FT-IR-ATR analyses were carried out to confirm the composition of precipitate formed. Effectiveness of each formulation was measured by chemical retention, chemical penetration and laboratory no-choice feeding test using dry-wood termites. Mortality rate and wood weight loss of the test blocks were observed in termite no-choice feeding test. Wood preservatives made by MPG showed an earlier precipitation than MEG and wood preservatives having 20% boron precipitated earlier than that of the ones having 15% and 10% boron. This indicates that both type of solvent and boron concentration have a direct influence for the precipitation of borates in wood preservative. There was a remarkable difference between penetration and retention of wood preservatives made by different solvents and boron concentration. Highest penetration and retention were observed in the formulation containing 20% B in MPG. According to the termite no-choice feeding test, all the formulations showed 100% mortality when applied them in 1:1 (by volume) aqueous dilution of borate/glycol. Termite mortality increased from about 83% to 100% with increasing boron percentage 15% to 20% when applied 1:2 aqueous dilution of borate/glycol. According to the results obtained, 15% B in MEG with 1:1.50 boric acid to borax ratio is the suitable formulation for borate-glycol wood preservative owing to its high effectiveness to wood destroying insects, long shelf life and cost effectiveness.

Keywords: preservation, borates, shelf life, retention, penetration, mortality