

Synthesis and Antimicrobial Activity of Phosphate Fatliquoring Agent from Soybean Oil Sediment

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Abstract: Phosphate fatliquoring agent was synthesized through interesterification, phosphorylation and hydrolysis with dehydrated soybean oil sediment as raw materials. The antimicrobial activity of the product was identified by the bacteria inhibition zone method. The results show that the optimum interesterification conditions were n(methanol):n(the oil) as 5.0:1, temperature as 65 °C, time as 4 h and solid acid catalyst as 1.5%. Many better properties in the interesterification reaction appeared using solid acid $\text{SO}_2\text{-}^4/\text{ZrO}_2\text{-TiO}_2$ as catalyst, such as retrievable catalyst with high activity, non-pollutants discharge and high yield of reaction. The optimum phosphorylation conditions were: mass ratio of the hydroxyl value of the interesterification product to P_2O_5 as 2.8:1, temperature as 75 °C, time as 4h. The optimum hydrolysis conditions were: n(P_2O_5): n(H_2O) as 1:1.5, temperature as 60 °C, time as 1 h. 10 # machine oil was used as dispersant for P_2O_5 in the phosphorylation to avoid moisture absorption, caking and carbonization of the reactant, non-uniform reaction and too high reaction rate at initial stage. The molar ratio of mono-phosphate to di-phosphate reached 4.05 and the mass fraction of phosphoric acid in the product was as low as 4.51% under the optimal conditions. Through neutralization, the fatliquoring agent with reddish-brown color, good fluidity and desired emulsion stability was obtained. The antimicrobial activity of the final product was identified with *escherichia coli* and *staphylococci* as tested bacteria. The results show that the fatliquoring agent had certain antimicrobial effect within the pH value range of the fatliquoring process.

Key words: soybean oil sediment; phosphorus pentoxide; interesterification; phosphorylation; antimicrobial activity