STUDIES ON SYNTHESIS AND SELECTED CATION ADSORPTION OF RESINS DERIVED FROM *Acacia farnesiana* POD TANNIN

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ABSTRACT

The synthesis and ion exchange capacity of resins derived from *Acacia farnesiana* pod tannin were explored. The main objective of this study was to find out the feasibility of using vegetable tannin as a substitute for phenol in phenol-formaldehyde resoles. Mature pods of *Acacia farnesiana* were collected from different localities in the Batticaloa district of Sri Lanka. The sample extracted with 80 % (v/v) methanol in water yielded a staggering 54.57 % (w/w) of tannin on a dry mass basis. Qualitative tests carried out on the extract revealed that a hydrolysable type of tannin was present in the pods. The extracted tannin was used to prepare formaldehyde based resole resins with varying tannin to phenol ratios. The synthesized novel resins were used to study the ion exchange capacity for Na^+ and Ca^{2+} ions in aqueous solutions. The virgin resins were converted to their sulfonated forms to increase their ion exchange capacities, since the ion exchange capacities of the virgin resins were found to be relatively low. The highest adsorption capacity for Na^+ ion was shown by the resin $RT_0P_1SO_3H$ (0.7025 meq g^{-1}), while the resin $RT_3P_1SO_3H$ (0.2408 meq g^{-1}) displayed the highest adsorption for Ca^{2+} ion. The highest ion exchange capacities were shown for Na^+ ion for both sulfonated (0.7025 meq g^{-1}) and virgin (0.1000 meq g^{-1}) resins. The ion exchange capacities of the synthesized novel resins for Ca^{2+} ion were compared with that of a commercial resin (Dowex 50-X8, Na^+ form), and the results revealed that the synthesized sulfonated resins: $RT_3P_1SO_3H$, $RT_2P_1SO_3H$ and $RT_1P_1SO_3H$ exceeded the ion exchange capacity of the commercial resin for Ca^{2+} ions, and had the potential to be utilized as ion exchangers in hard water treatment.

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