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## Synthesis, characterization, and metal adsorption of Tannin Phenol Formaldehyde Resins obtained from flower buds of *Terminalia turbula*.

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Tannin was extracted using different solvent/solvent systems from flower buds of *Terminalia turbula*. They were polymerized with phenol and formaldehyde to form Tannin Phenol Formaldehyde (TPF) resins of different molecular structure. The resins obtained were sulfonated using concentrated $H_2SO_4$ acid and were converted to $Na^+$ form. The resins obtained were characterized by using FTIR Spectroscopy. Ion exchange capacity of both TPF and sulfonated TPF were estimated for bivalent cations $Zn^{2+}$, $Pb^{2+}$, $Ca^{2+}$, $Mg^{2+}$ and $Cu^{2+}$ using their $Na^+$ forms in burette type exchange columns. FTIR results show the successful formation of TPF, sulfonation of them and complexation with the metal ions.

The ion exchange capacities of TPF resins formed were weak due to weak acidic character of phenolic groups attached to the resins. The sulfonation increased the ion exchange capacity of the resin significantly. The resin that contains tannin: phenol ratio 1:0.5 gave the highest exchange capacity (e.g. 0.105 Cmmol/g for $Pb^{2+}$). The capacity was increased by nearly three times in its sulfonated form (e.g. 0.305 Cmmol/g for $Pb^{2+}$). As the capacities obtained for sulfonated TPF resins are about fifty percent of capacities of commercially available resins, it can be concluded that they can be used as ion exchange resins made using locally available renewable resources.

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