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Bioremoval of heavy metals from wastewaters by spent tea leaves

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When mining industries do not discard residues properly, waste waters contaminated with heavy metals can negatively affect living environments. Spent peppermint (PM) and green tea (GT) leaves were used as potential adsorbents of copper (II) and zinc (II) ions in aqueous solutions. Equilibrium parameters such as acidity, mass of adsorbent, heavy metal concentration, presence of crowding agents and salinity were studied to optimize the adsorption in batch experiments at room temperature. Adsorbents were characterized by TGA, FTIR and SEM techniques and their surface and porosity determined by wet experiments. It has been shown by experimental data that adsorption of copper (II) is maximized at pH 7 using PM with an adsorbent mass of 100mg. On the other hand, copper (II) adsorption with GT is maximized at pH 6, with an optimum adsorbent mass of 100 mg as well. Zinc (II) was greatly adsorbed at pH 6, with optimum adsorbent masses of 150 mg and 200 mg for PM and GT, respectively. Furthermore, the adsorbents also reached their highest adsorption in the absence of salts and crowding agents with maximum initial concentrations of copper (II) and zinc (II) of 100 ppm and 110 ppm, respectively. Adsorbent characterization indicates the presence of alcohol and carboxyl groups as the most relevant active sites on the adsorbents. Surface and porosity studies also evidence a good competitiveness with the conventional adsorbents.

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