# ANIONIC TANNERY DYE ADSORPTION ON BIOSORBENT DERIVED FROM TANNIN EXTRACTED WASTE

**Jannatul Nime Tabassum, Md. Shahriar Shahadat, Md. Abul Hashem*, Md. Mukimujjaman Miem, Modinatul Maoya**

*Khulna University of Engineering & Technology,Bangladesh*

*hashem_518@yahoo.com*

Safe water is essential for all living things. Due to increasing industrialization, urbanization, and unawareness, the population is at risk of safe water scarcity.Human health and aquatic ecosystems are threatened by the presence of dyestuffs in water stream. In leather processing, mostly anionic dyestuffs are used; after deying, a significance amount of dyestuffs are remained in wasteater. Removal of dyestuffs is essential before discharge into the environment. This study investigates anionic dye adsorption from synthetic wastewater on thermally activated biosorbent. The biosorbent is derived from tannin-extracted waste.It was characterized before and after absorption using Fourier Transform Infrared (FTIR) spectroscopy, Scanning Electron Microscope (SEM), and Energy Dispersive Spectroscopy (EDS). A batch adsorption test was conducted for dye adsorption on the biosorbent.

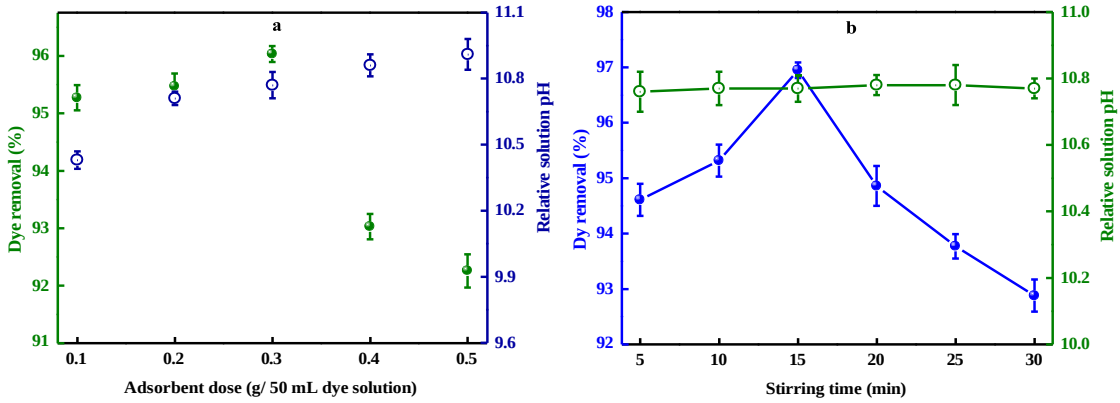


Figure 1. Effect of adsorbent dose on dye removal (a) and effect of contact time on dye removal

Figure 1a shows the effect of biosorbent dose on dye adsorption. Dye removal capacity increased as the biosorbent dose increased. For biosorbent doses of 0.1 g, 0.2 g, and 0.3 g, dye removal was 95.3%, 95.5%, and 96.0%, respectively. Dye removal efficiency decreased for 0.4 g and 0.5 g. This was due to the absence of free active sites in the biosorbent. Figure 1b shows the effect of stirring on dye adsorption. Dye removal for stirring times of 5, 10, and 15 min was 94.6%, 95.3%, and 96.9%. Stirring time over 15 min led to a gradual decrease in dye removal. The likely reason is desorption of dye from the biosorbent. The dye adsorption mechanism was characterized using adsorption isotherm and kinetics models. The pseudo second order (PSO) kinetic model showed a satisfactory regression coefficient. Adsorption fit well for the Freundlich isotherm model. FTIR and EDS spectra as well as SEM micrographs of pure and dye-loaded biosorbent confirm dye adsorption from wastewater. This study reveals a pathway to use waste material for dye removal from wastewater.