Technical Sessions : A - 06

Sorptive removal of 4-nitroaniline from aqueous solution by using magnetized tea-waste biochar

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4-Nitroaniline (4NA) is a synthetic precursor of pharmaceuticals, fuel additives, corrosion inhibitors, pesticides, antiseptics agents and azo dyes. Residue 4NA has shown adverse effects in aquatic ecosystems. Biochar (BC) is a low cost adsorbent produced by anaerobic thermal degradation of waste biomass known as pyrolysis. Tea-waste is an excellent raw material for BC production in Sri Lanka due to high availability and low cost. Pyrolysis of biomass was done at three different temperatures (300, 500 and 700 ^{0}C) and magnetically modified. Magnetic BC (MBC) were successfully used for the removal of 4NA from water. The FTIR measurements confirmed that the BC produced at low temperatures (LTBC) have high amount of surface functional groups in comparison with BC produced at higher temperatures (HTBC). Maximum adsorptions for both MBA and NBA occurred at mild acidic conditions (pH = 2-4) and HTBC showed higher adsorption capacities than LTBC. Sorption of 4NA onto tea-waste BC were well fitted into both Langmuir and Freundlich isotherm models (R2>0.99). The π^+ - π electron donor acceptor interactions between electron donating arene rings of BC surface and positively charged nitrogen atoms in 4NA can be considered most dominating sorption mechanism at acidic conditions. Increased sorption capacities were observed at higher temperatures indicating endothermic sorption. There were no significant loss in adsorption capacity due to magnetic modification. The magnetic modification allowed easy recovery of sorbent which can be cost effective in industrial applications. Sorption capacities have not been depleted upon magnetic modification.

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Technical Sessions : A - 07

Enapsulation of lemongrass oil in chitosan: formulation and characterization

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Essential oils are gaining increasing interest in food, pharmaceutical and agricultural industries due to their natural and safe status, wide acceptance by consumers, and multidimensional functional properties. This study was carried out to encapsulate lemongrass oil in chitosan to increase its bioavailability. Microencapsulation of lemongrass oil was carried out using ionotropic gelation of chitosan crosslinking with sodium tripolyphosphate (STPP). The effect of varying amount of polymer, crosslinker and oil on encapsulation efficiency (EE), oil content, and release rate were determined. Gas chromatogram of lemongrass oil indicated the presence of Citral-B (34.12%) and Citral-A (44.31%) as the major constituents. According to optical microscopic images, MCs are spherical in shape and their size varies from 38.66 ± 0.46 to 96.33 ± 0.05 μm. Scanning electron microscopic image of the oil loaded capsules further evidence the spherical shape of MC with a smooth surface while empty capsules had a layered structure. The particle size and EE increased with increasing oil load, polymer and crosslinker concentration. High oil load and polymer concentration lowers the efficiency of the dispersion force (1000 rpm) resulting higher particle size. Increasing crosslinker concentration increases the oil retention. When the polymer concentration is high, solution contains excess polymer to encapsulate oil vesicles. All of these contribute to higher EE. However, EE decreases when the viscosity of the solution is too high which result in lower dispersion of oi/water emulsion. EE increases with increasing cross-linker concentration as a compact solid matrix is formed which lead to increased number of formed MCs. After a critical concentration
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