ADSORPTION OF AMMONIUM USING POMEGRANATE PEEL AS LOW-COST ADSORBENT

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Abstract

Ammonia nitrogen (NH3 - N) is one of the common and toxic species of nitrogen and excess amount in waterway causes eutrophication, decreased in dissolved oxygen and toxic to aquatic organisms. This one of the major global environmental problem may originate from diverse sources such as industry waste, agricultural runoff and landfill leachate. According to the European Union legislations; the maximum limit for nitrogen compounds discharged onto waterways is between 10 and 30 mg/L.

In this work, adsorption was investigated which is one of the best ammonium removal methods. Recently a great efforts have been made to identify new low-cost and efficient adsorbent from agricultural waste and by-products because of their abundant availability, low-cost and eco-friendly advantages. Furthermore they could offer the possibility to recycle ammonium back for agricultural purposes.

Pomegranate peel (PP) is an agricultural waste worldwide available in large amounts, and previous research proves this adsorbent can removed variety of pollutant from wastewater such as heavy metals and dyes. However, available information on the ammonium adsorption by (PP) still missing.

The main purpose of this study was to investigate the potential of pomegranate peel (PP) for the removal of ammonium ions from aqueous solution through the determination of zeta potential, iodine number and surface active sites of raw (PP). Series of batch adsorption experiments in NH_4Cl solution was designed to determine the impact of various parameters such as pH, contact time, agitation speed, adsorbent (particle size and dose) and adsorbate concentration in the adsorption process and therefore modelling the adsorption isotherm and kinetics. A comparison of adsorption capacity between unmodified and chemically modified PP with sodium hydroxide (NaOH) and potassium hydroxide (KOH) is also reported in this study.

Key words: Pomegranate peel, Ammonium adsorption, Agricultural waste, low-cost adsorbent.

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