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Use of Polymeric Adsorbent Amberlite IR120 H Resin for Isonicotinic Adsorption

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Abstract

The present work deals with the study of adsorption of isonicotinic acid (iNA) onto Amberlite IR120 H. Equilibrium and kinetic experiments are carried out to determine the effect of adsorbent dose (10 g/L to 70 g/L) initial concentration of iNA (0.01 M to 0.05 M), contact time (0 to 40 min) and temperature (298 to 333 K) on the capacity of the adsorbent. With an increase in the adsorbent dosage, the uptake capacity of adsorbent is found to decrease but with an enhancement in the recovery efficiency. The optimum dosage of adsorbent is found to be 50 g/L. In the kinetic experiments, the percentage removal of iNA reaches to a constant value of 95% with Amberlite IR120 H (50 g/L) after 30 min. Increased temperature shows reverse trend in the removal efficiency of iNA. The change in enthalpy and entropy are estimated to be -8.80 kJ/mol and -19.78 J/mol/K, respectively. Equilibrium data are analyzed by using Langmuir, Freundlich and Temkin isotherm models. Kinetic models such as pseudo-first order, pseudo-second order and intra particle diffusion models are used to predict the kinetics of the adsorption process by Amberlite IR120 H for the removal of iNA.

Keywords: *Adsorption; Isonicotinic acid; Equilibrium; Kinetics; Resin.*

1. Introduction

Pyridine carboxylic acids (picolinic, nicotinic, and isonicotinic) are important and potential bioactive chemicals finding applications in metabolism. The natural and synthetic derivatives of these acids are used in remedial chemistry as they show physiological activities. Picolinic acid is an efficient chelating agent for the metals like Cu, Fe, Ni, Zn, Cd, Pb, Mn, Cr, and Mo inside the human body [1]. Chromium picolinate as food supplement helps in carbohydrate and lipid metabolism controlling type 2 diabetes [2]. Nicotinic acid is a water-miscible vitamin, and assist in both DNA repair and the formation of steroid hormones in the adrenal gland. The

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