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APPLICATION OF RESPONSE SURFACE METHODOLOGY FOR OPTIMIZATION OF PALM KERNEL SHELL ACTIVATED CARBON PREPARATION FACTORS FOR REMOVAL OF H_2S FROM INDUSTRIAL WASTEWATER

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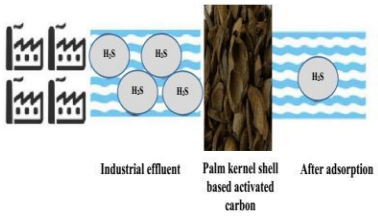
Graphical abstract



Abstract

Hydrogen sulfide (H_2S) present in the industrial wastewater can be removed using activated carbon produced from palm kernel shell. In this study, three factors namely activation temperature, impregnation ratio of potassium hydroxide to precursor and activation contact time were investigated for the preparation of activated carbon from palm kernel shell (ACPKS) as an adsorbent toward removal of H_2S from synthetic wastewater using central composite design (CCD). Chemical activation method was used to activate the adsorbent with different conditions using KOH as an activating agent. The batch mode was utilized for studying adsorption process. Two responses (removal efficiency (RE, %) and yield of adsorbent (Y, %) are tested by means of two quadratic models. The results shown that the optimum conditions for ACPKS preparation are activation temperature of 829.4 ℃, KOH to precursor ratio of 3.01 w% and activation time of 85 min with responses of 94.41% RE and 39.4% of ACPKS yield. The study recommended that, ACPKS is the promising adsorbent for removing H_2S from wastewater and other aqueous solutions.

Keywords: Palm kernel shell, hydrogen sulfide, response surface methodology, statistical analysis

Abstrak

Kehadiran hidrogen sulfida (H_2S) dalam air sisa industri boleh dsingkirkan dengan menggunakan karbon teraktif daripada cangkerang biji sawit. Dalam kajian ini, tiga faktor (suhu pengaktifan, nisbah penghamilan kalium hidroksida (KOH) kepada pelopor dan pengaktifan masa sentuhan) telah diselidik untuk persediaan karbon teraktif daripada cangkerang biji sawit (ACPKS) sebagai penjerap terhadap penyingkiran H_2S daripada air sisa sintetik menggunakan reka bentuk komposit tengah (CCD). Kaedah pengaktifan kimia telah digunakan untuk mengaktifkan penjerap dalam pelbagai keadaan yang berbeza menggunakan KOH sebagai agen