

Optimization Of Parameters For The Preparation Of High Yielded Activated Carbon From Banana Trunk

Mohammed Danish, Sreleka Ragunathan, Tanweer Ahmad, Mehraj Ahmad

Technical Foundation Section, Malaysian Institute of Chemical and BioEngineering and Technology, Universiti Kuala Lumpur, Melaka, Malaysia

Department of Chemistry, School of Natural Science, Madda Walabu University, Bale Robe, Ethiopia

Institute of Nutrition (INMU), Mahidol University, 999 Phutthamonthon 4 Rd., Salaya, Nakhon Pathom 73170, Thailand

Abstract

This experiment was conducted to optimize the operating conditions for the production of activated carbons from banana trunk. The dried banana trunk which contained 6.43% moisture, 8.8% ash content, 25% volatile matters, and around 59.77% fixed carbon was found suitable for the production of activated carbon. The chemical activation method was adopted in this experiment. The dried banana powder impregnated with different concentrations of phosphoric acid was optimized for high yielding activated carbons using rotatable central composite design of response surface methodology (RSM). Three operating parameters, such as activation time (35.5, 50.0, 85.0, 120.0, and 134.5 min), activation temperature (367, 450, 650, 850, and 932 °C), and H₃PO₄ concentration (0.36, 1.50, 4.25, 7.00, and 8.14 mol/L) played a significant role in the production of activated carbons. The results showed that the maximum yield of banana trunk activated carbon was achieved at the activation time of 60 minutes, activation temperature of 480 C, and H₃PO₄ concentration of 3.94 mol/L. At optimum conditions of operating factors, the percent yield predicted through statistical model was 47%, whilst on experimental verification it was found 46.05%.

Keywords: Activated carbon, Banana Trunk, Chemical activation, Optimization, Yield