Rice husk derived silica gel as a desiccant and TLC stationary phase

Thilakarathna W.D.N., Samaraweera A.P.K., Bandara N.G.H.J.,

Ratnaweera C.N.*

Department of Chemistry, University of Ruhuna, Matara, Sri Lanka

Silica gel is a highly porous substance and is formed as a granular form of silicon dioxide. It is a popular desiccant used in many commercial applications. Moreover, silica-gel is used as stationary phase material in thin layer chromatography (TLC) and column chromatography. Extraction of silica-gel from granular form is expensive, therefore in this research we investigated a low-cost method to extract silica gel from rice husks and determined their properties. Silica-gel was produced primarily under three steps; (1) obtaining rice husk ash through burning or pyrolyzing, (2) treating with NaOH to obtain sodium silicate in microwave oven or water bath, and (3) precipitating silicic acid using HCl. The first two steps are highly energy-consuming. Therefore, instead of a more energy-consuming muffle furnace, we used open burned ash. Also, we used microwave heating instead of water-bath heating to obtain soluble silicate. Accordingly, average yields obtained for the open burn-water bath method, open burn-microwave method, muffle furnace-water bath method, and muffle furnace-microwave method were 51.9%, 88.27%, 66.75%, 82.29% respectively. The highest yield of silica-gel and the best water adsorption ability were obtained with open burning and microwave approach which is low cost compared to other approaches. Furthermore, successfully developed a silica-gel material for thin-layer chromatography (TLC) plates utilizing rice husk-derived silica and ran a sample test using benzoic acid as the analyte. Resulted Rf value revealed a close agreement with the standard values. However, further investigations needs to be conducted for several other analytes and solvents to validate these results.

Key words: Low cost, Rice husk ash, Silica gel, Water adsorption, TLC plate

*Corresponding author: nadun@chem.ruh.ac.lk