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Application of Nitric Acid Modified Cocos nucifera, Pennisetum glaucum and Sorghum bicolor Activated Carbon for Adsorption of H_2S Gas

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Abstract : The potency of modified and unmodified activated carbons prepared from shells of Cocos nucifera (coconut shell), straws of Pennisetum glaucum (millet) and Sorghum bicolor (sorghum) for adsorption of hydrogen sulphide gas were investigated using an adsorption apparatus (stainless steel cylinder) at constant temperature (ambient temperature). The adsorption equilibria states were obtained when the pressure indicated on the pressure gauge remained constant. After modification with nitric acid, results of the scanning electron microscopy of the unmodified and modified activated carbons showed that HNO3 greatly improved the formation of micropores and mesopores on the activated carbon surface. The adsorption of H2S gas was found to be highest in modified Cocos nucifera activated carbon with maximum monolayer coverage of 28.17 mg/g, and the adsorption processes were both physical and chemical with the physical process being predominant. The adsorption data were well fitted into the Langmuir isotherm model with the adsorption capacities of the activated carbons in the order modified Cocos nucifera > modified Pennisetum glaucum > modified Sorghum bicolor > unmodified Cocos nucifera > unmodified Pennisetum glaucum > unmodified Sorghum bicolour.

Keywords : activated carbon adsorption, hydrogen sulphide, nitric acid, modification, stainless steel cylinder
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