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Simultaneous adsorption of three emerging contaminants using microwave treated activated carbon



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Tumerous emerging contaminants are being detected in effluents of dense urban settlements and pharmaceutical industries. Simultaneous removal using activated carbon adsorption is an effective way of removing these traces compounds. However, multicomponent adsorption studies on emerging contaminants are rather limited. In literature, processes such as nanoparticle impregnation, thermal, acid, base and aqueous treatment on activated carbon increased the adsorption performance in terms of rate or capacity. In present study, microwave was applied to activated carbon at three different conditions namely, dry, wetted and immersed in solution. The volumetric heating provided by microwave affect the particles directly with higher heating rate compared to conventional heating. These modified carbons were used for simultaneous removal of a ternary system. Dry carbon subjected to microwave heating had improved adsorption which may be attributed to changed porous structure and removal of certain surface functional groups. For wetted carbons, microwave effect is seen in two stages. First, until sulfuric acid gets evaporated, desired surface functional groups are introduced, later on the pore structure gets widened which leads to higher performance while adsorption. Thus, for wetted carbon, lower power treatment reduced the performance while higher power and time improved the performance. Microwave heating applied onto activated carbon immersed in acid resulted in poor performance. Microwave modifications in dry and wetted conditions show promising scope for intensification and better performance.

Biography

Retnam Bharathi Ganesan is currently working on removal of emerging contaminants from water by adsorption using activated carbon. While pursuing his PhD in Chemical Engineering at Indian Institute of Technology Madras, India; his research area includes but not limited to mass transfer and process intensification. He is interested in transplanting ideas from nature to Chemical Engineering processes and vice versa to understand nature. He has received his Bachelor's at NIT Trichy in 2011, India and Master's at IIT Kanpur, India during 2014 in the field of Chemical Engineering. He has worked as a Contractual Lecturer for a semester at Department of Chemical Engineering, NIT Srinagar, India during May 2015. During his free hours, he could be found devouring science non-fiction books related to origin and evolution of universe and life.

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