Green Wastewater Treatment: Using Graphene Oxide Produced from Date Pits to Degrade Organic Dyes via Novel Microwave Technique

Alshahrani, Abdulaziz

Water treatment is currently considered as one of the top research priorities in Saudi Arabia. It has been reported by World Health Organization that 50,000 people die every day from diseases associated with contaminated water. This research attempts to degrade organic pollutants present in wastewater by using Graphene Oxide synthesized from a Saudi natural source. Physical activation of date pits samples was carried out by carbonization at different temperatures to produce active carbon. Hammer's method was employed for the purpose of Graphene Oxide production. The resulted Graphene Oxide was characterized using FT-Raman, XRD and SEM techniques. Methylene Blue (MB) dye was used as a model organic pollutant to investigate the high reactivity of Graphene using a microwave-system (MS). A modified domestic MS furnace with variable power was used to supply microwave energy. The MB solution, 2.5x10-6M, was mixed with 0.1gm of Graphene Oxide. The applied microwave power was provided between 100 to 700 W and the time was set between 0 to 12 minutes. The samples were centrifuged and then filtered through a millipore filter to remove the Graphene Oxide dispersed particles. The results show that 98% of the initial concentration of MB is removed effectively within 12 minutes under a microwave power of 500 W. Chemical oxygen demand is shifted from 450 to 87 mg/L, while the demand for biological oxygen decreased from 270 to 12.8 mg/L. Hopefully, this method can provide valuable future benefits in the water purification from organic pollutants.

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