Assessment of Coconut Graphene Oxide Manganese Catalyst on Microplastics Degradation

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Microplastics (MP) are plastic debris smaller than 5 millimeters that are left behind from plastic pollution, which poses a threat to human health and marine life. In this study, a natural coconut graphene oxide/Mn catalyst was made and tested to see if it enhanced the degradation of MPs through PMS activation. Coconut charcoal was made from coconut shells. This powder was burned in a nitrogen atmosphere to make graphene oxide. Manganese chloride was added to the graphene oxide and both substances were mixed in isopropyl alcohol. This mixture was sonicated and refluxed for 1 hour total at 80 degrees Celsius. Potassium permanganate was added to the mixture. Refluxing continued for one hour and the final solution was filtered and dried at 50 degrees Celsius to form the catalyst. The catalyst was added to MPs and PMS in water and put in a water bath for various hours. The MPs were dried, filtered, and weighed for the final mass. Data was collected using mass-loss equations, FTIR Spectroscopy, and X-Ray Diffraction. This study demonstrated that a successful natural graphene oxide/Mn catalyst that effectively degraded MPs was produced. Mass loss data showed the catalyst degraded a higher percentage of MPs compared to the control. FTIR analysis and X-ray diffraction helped identify the formation of coconut charcoal, coconut graphene oxide, and the catalyst. Further research is needed to test the catalyst in its ability to degrade MPs and more techniques need to be utilized to further determine the composition of the catalyst, such as elemental analysis and SEM imaging.

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