

Effects of Radiolysis and K₂MnO₄ Solution on Synthesis of Graphene Oxide from ZnC Batteries for Recycling of Hazardous Waste

by Wipsar Sunu Brams Dwandaru, Suparno, Supardi, Buky Wahyu Pratama, Lia Desi Parwati, Rhyko Irawan Wisnuwijaya, Emi Kurnia Sari dan Sulvi Septiyani

ABSTRACT

The purpose of this study was to determine the effect of water radiolysis and the addition of K₂MnO₄ solution to the characteristics of graphene oxide (GO) material. This research was conducted by synthesizing GO using the modified audiosonic hot plate magnetic stirrer method. 200 ml of distilled water were given radiation treatment using an X-Ray Generator for 2 hours at 20 kV. Mix 100 ml of irradiated water with 2 grams of graphite and 0.5 gram of K₂MnO₄ using magnetic stirrer for 15 minutes. Exposing audiosonic waves to samples with a frequency of 100 Hz accompanied by stirring and heating using a hot plate magnetic stirrer at a temperature variation of 60 °C and 120 °C for 2 hours. This process causes the water in the sample to dry (the sample turns to powder). After drying, the sample was dissolved with 100 ml of irradiated water and varied with and without the addition of 15 ml of HCl. The UV-Vis Test results show the absorbance peak at a wavelength of 202 nm and the sloping peak at 271 nm. This only happens to GOs heated at 60 °C without the addition of HCl. Meanwhile, for GO samples that are heated at 60 °C with the addition of HCl does not bring up the peak, so does the temperature of 120 °C with and without the addition of HCl. The test results show the presence of hydroxyl (OH) groups at wave numbers around 3400 cm⁻¹ and C = C function groups at wave numbers around 1600 cm⁻¹. XRD test results of graphite samples showed a high peak intensity at 2θ around 25°. Whereas for GO, a peak of 2θ appears around 12°. This is consistent with XRD data from GO, which is generally around 10°. From the test results that have been done, it can be concluded that GO synthesis has been achieved.

Kata Kunci: *GO, ZnC carbon battery waste, MnO₄ ZnC battery waste, water radiolysis, audiosonic sonication*