SYNTHESIS OF XEROGRAPHIC TONER POWDERS USING COCONUT SHELL ACTIVATED CARBON BLACK AND NANOMAGNETITE FROM BUTTALA IRON ORE DEPOSIT IN SRI LANKA

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Recently, xerographic printing technology has been rapidly developed with the use of dry toner powders for a quality printing process. Polymeric resin, pigment, and charge control agents are the basic components of toner powders. Carbon black is the primary pigment used in toner preparation, which is obtained by incomplete combustion of petroleum or organic materials. Magnetite is employed as the main charge control agent, which is useful in generating triboelectric properties during the printing process. This study aims to synthesize a toner powder through a physical pulverization process that uses activated carbon black prepared from coconut shells and nanomagnetite produced from the natural Buttala iron ore deposit in Sri Lanka. First, activated carbon black was prepared from coconut shells through partial pyrolysis, followed by NaOH activation. The nanomagnetite was synthesized from Buttala iron ores through a high-energy ball milling process. Styrene-acrylic copolymer was added as the polymer resin in the toner preparation with prepared activated carbon black and nanomagnetite according to 5:2:2 mass ratios. The resulted dry paste was pulverized to obtain micro-sized toner powders. This final product was morphologically, mineralogically, and chemically investigated using Scanning Electron Microscopic (SEM) images, X-ray diffractometer (XRD), and Fourier-Transformed Infrared (FTIR) spectroscope respectively. The resulted XRD pattern shows major peaks related to magnetites, as in the typical toner powder. The SEM images demonstrate the irregular shape particles with rough surfaces, compared to other commercial toners. The particle size of the toner powder diameter varies from 10 µm to 100 µm, and is comparable to commercial toner particles, making it suitable as toner powder. The FTIR pattern reveals aromatic C=C stretching, aliphatic C-H stretching, and C=O stretching as commercial toners. Synthesized toner is expected to be used in the real printing process as it approaches the characteristics of commercial toner powders.

Keywords*:* *Toner powder, Nanomagnetite, Activated carbon black, Buttala iron ore deposit, SEM*