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Data Article

Nano-cellulose derived bioplastic biomaterial data for vehicle bio-bumper from banana peel waste biomass

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ABSTRACT

The innovative study was carried out to produce nano-cellulose based bioplastic biomaterials for vehicle use coming after bioprocess technology. The data show that nano-cellulose particle size was 20 nm and negligible water absorption was 0.03% in the bioplastic. Moreover, burning test, size and shape characterizations, spray coating dye, energy test and firmness of bioplastic have been explored and compared with the standardization of synthetic vehicle plastic bumper following the American Society for Testing and Materials (ASTM). Tensile test was observed 120 MPa/kg m³. In addition to that pH and cellulose content were found positive in the bioplastic compared to the synthetic plastic. Chemical tests like K, CO₃, Cl₂, Na were determined and shown positive results compared to the synthetic plastic using the EN-14214 (European Norm) standardization.

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Specialization Table

Subject area	Biological Chemistry
More specific subject area	Bioplastic biomaterial from banana peel biomass

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Type of data	Table and figure
How data was acquired	SEM, pH meter, Tensile test was performed by Universal Test Machine, absorption test, burning test, crack test, energy test, chemical test by ASTM and EN standard
Data format	Raw data collection and analysis
Experimental factors	Samples pyrolysis, acid hydrolysis
Experimental features	3 Replicates were used in the experiment as Complete Randomized Design (CRD). The sample was selected randomly from the different lots
Data source location	Hail city, Saudi Arabia
Data accessibility	Data are presented in this article

Value of the data

- The data are an innovative and important in the research area of nano-cellulose based bio-plastic biomaterials utilizing banana peel waste biomass in the pharmaceuticals, medical, biomedical and bioengineering aspect.
- Innovative information regarding biopolymer production from biomass has been explored. The data can be most useful for the researcher, research student and academician to acquire innovative knowledge.
- Identification of the suitability of produced nano-cellulose based bio-plastic materials plays a significant role for the researcher in further studies for automotive biobumper production.

1. Data

The data have been shown the sample collection, preparation and biochemical process in Figs. 1.1–1.5. Fig. 1.1a shows the procedure of nano-bioplastic and biobumper preparation. Moreover, Fig. 1.2 demonstrates the absorption test of nano-cellulose based bioplastic. Fig. 1.3 indicates the burning test image. The Universal Test Machine procedure is denoted in Fig. 1.4. Besides, nano-bioplastic having spray coating test has been exhibited (Fig. 1.5). From the data it had been seen that nano-cellulose particle size was 20 nm found in the bioplastic. It was considered for plastic bumper as mentioning the result of ASTM (0–0.16) (Table 1.1). In addition to that burning test (Table 1.2), spray coating dye (Table 1.3), size and shape characterizations (Table 1.4), energy test (Table 1.5), firmness test (Table 1.6) were found positive and standard in bioplastic compared to the synthetic plastic following ASTM standardization. Tensile test was observed 120 MPa/kg m³ (Table 1.7). In addition to that chemical analysis like K⁺, CO₃⁻, Cl₂, Na were determined (Table 1.8) and shown positive results compared to the synthetic plastic in the laboratory using the EN (166) standardization (Table 1.9).

2. Experimental design, materials and methods

2.1. Sample collection and preparation

A total of 10 kg waste banana samples (*Musa acuminata*) were collected from the local market, Hail city, KSA. Afterwards, banana peel was removed and washed to ensure proper cleaning. Washed peel was sliced with scissors, then the sliced peel was blended using conventional blender. After blending, the sample was ground again with mortar and pestle, to get a fine mixture and put it into the beaker.

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