Modifying Plastic by the Addition of Cellulose Acetate Derived from Cigarettes

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The purpose of this project was to determine if cellulose acetate extracted from cigarette filters could enhance the properties of plastic and reduce the amount of plastic used for the production of different plastic products when added in different ratios.The hypothesis was that as the percentage of the refined cellulose acetate increased, the properties of plastic would enhance.The procedure consisted of extracting cigarette filters from in cigarette butts manually,refining them,and crushing them into pellets.They were then first placed in hexane overnight,a nonpolar solvent,so to dissolve the nonpolar solutes.Then they were placed in water,a polar solvent,so to dissolve the polar solutes.After the refining process,they solidified.Then they were crushed into pellets.The next step involved adding pellets to plastic in ratios of 2%,5%,10%,and 15% mass by mass.Two different kinds of plastic were used; “polypropylene-PP-575P” and “polystyrene PS-100”.Results were charted and analyzed in order to study if any changes occurred for both.In term of the resin properties the melt flow rate increased(test methodD-1238)while the density remained(constant test methodD-792).In terms of the mechanical properties the tensile strength decreased(test method D-638),the tensile elongation increased(D-638),the flexural strength increased and the notched Izod impact strength(D-256)and Rockwell hardness (D-785)both remained constant.Finally,for the thermal properties,the Vicat softening point increased(D-15258)while the heat deflection temperature increased.The results indicate that when a greater amount of cellulose acetate was added to the plastic,the properties of the plastic enhanced.This waste management process recycles cigarette butts and reduces the consumption of raw material.

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