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RECYCLING CIGARETTE BUTTS FOR ANTI-CORROSIVE COATINGS: APPLICATION ON A36 STEEL PROTECTION IN ACIDIC ENVIRONMENTS

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Abstract

Cigarette butts are among the most prevalent urban pollutants because of their slow biodegradation and toxic components (nicotine, tar, heavy metals). This study proposes an innovative strategy to recycle these residues into an eco-friendly anti-corrosive coating for A36 steel, a material widely used in construction. Antioxidant compounds were extracted from cigarette filters using ethanol and then applied as a protective layer on steel plates. Coated and uncoated plates were immersed in nitric acid solutions (1 M, 3 M, 5 M) for five days to simulate aggressive industrial conditions. Weight-loss measurements and Scanning Electron Microscopy (SEM) analyses were used to evaluate the coating's effectiveness. Results showed that the cigarette-filter-based coating reduced the corrosion rate by up to 45% in moderate acid solutions (1 M and 3 M), forming a uniform protective barrier that limited acid penetration. SEM images confirmed the presence of a continuous coating layer on the steel surface. In highly acidic conditions (5 M), however, the coating's performance declined significantly, suggesting the need for reinforcement to improve its durability. This work introduces a novel circular-economy approach that simultaneously addresses cigarette butt pollution and provides corrosion protection in acidic environments, showing promise for future industrial applications.

Key words: anticorrosion, cigarette butts, circular economy, corrosion inhibitors, waste recycling

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