

Fabrication of Construction Material from Leather Buffing Dust to Manage Solid Waste

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Abstract

In leather processing, micro-fined collagenous leather buffing dust is one of the generated solid wastes in a tannery. It is impregnated with chromium, synthetic oil, dyestuffs, tanning agents, etc. The lack of proper management pollutes the environment and human society. This study aims to utilize leather-buffing dust to produce construction material. Various percentages (0%, 2%, 4%, 6%, 8% and 12%) of buffing dust mixed with clay and brick were fabricated. After sun drying, bricks were burned in a commercial kiln at 1000°C temperature. The physico-mechanical properties of the buffing dust incorporated brick are assessed to identify the possibility of utilization in brick production. Results indicate that 4% buffing dust incorporated bricks showed the maximum compressive strength of 12.02 MPa and other engineering properties-water absorption, weight loss on ignition, area shrinkage, bulk density, and efflorescence test results, were also in the acceptable range according to ASTM and Bangladesh Standards (BDS). The Scanning Electron Microscope (SEM) images imply that buffing dust played a significant role in the structure of fired bricks. The NEN 7345 and TCLP (USEPA 1311) leaching tests showed insignificant metal leaching and were far below the permissible limit. Thus, using buffing dust for the production of brick is quite feasible that will reduce environmental pollution as well.

Keywords: brick, compressive strength, eco-friendly, pollution reduction, waste recycling