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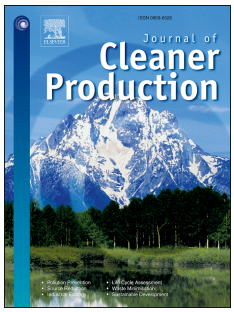

Recycled polyethylene terephthalate-based boards for thermal-acoustic insulation

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Recycled polyethylene terephthalate-based boards for thermal-acoustic insulation.

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Abstract

Polyurethane is used in the construction industry as thermal and acoustic insulation because of its excellent performance. However, its high flammability somewhat restricts its use. This study reported the effects of the addition of polyethylene terephthalate residues on the production of a fire-resistant thermal-acoustic insulation material. Composites containing 30%, 50% and 55% polyethylene terephthalate residue and alumina trihydrate were prepared. The composites showed high thermal stability (thermogravimetric analysis) and low flammability (UL-94 and cone calorimeter analysis) due to the presence of polyethylene terephthalate and alumina trihydrate. Microstructure analysis revealed a reduction in pore size for all composites of the polyurethane matrix, without compromising the thermal and acoustic insulation capacity of the material. This study demonstrated that the thermal insulation capacity was maintained, and the acoustic insulation capacity in the composites increased compared to polyurethane foams. It was also found that the compressive strength scores of the composites were suitable for possible application in buildings as fire-resistant thermal-acoustic insulation. The construction industry should incorporate a certain amount of residues into construction material formulations, thus becoming more sustainable.

Keywords: Flammability; Polyethylene terephthalate (PET); Polyurethane (PU); Recycling; Construction industry; Thermal-acoustic insulation.