Feasibility of using paper pulp residues into fired clay bricks

Muñoz P.

Letelier V.

Zamora D.

Morales M.P.

In accordance with global estimations, approx. 15 million tons of residues are yearly generated from paper and pulp industry, which are traditionally used as biofuels or just disposed in landfills. However, residues composition and laws in force urge producers to search for new waste management strategies. From another point of view, the construction industry uses more than 33% of total natural resources, worldwide which has led several governments to limit the use of natural raw materials for building. In particular, fired brick industry produces yearly approx. 1600 billion bricks which represents millions of tons of natural resources consumption. Therefore, the goal is to contribute to reduce the amount of used clay. Thus, this paper explores the mineral and technological properties of brick made by using different percentages of paper pulp residues and fired at 900 °C. Results indicate that by increasing the replacement ratio, blend requires larger amounts of water which leads to a proportional increasing of shrinkage during drying. In spite of mineral transformations are not influenced by paper pulp residue, the porosity is linearly increased which leads to reduce compressive strength and thermal conductivity up to 30% for 20% of replacement ratio, in both cases. Thus, it is concluded that series made by replacing up to 10% show compressive strength above 5 MPa, water absorption beyond 20% and toxicity indexes meet the mandatory requirements.

Brick

Compressive strength

Leachate

Paper

Residue

Thermal conductivity

Brick

Brickmaking

Compressive strength

Construction industry

Leachate treatment

Linear transformations

Mineral exploration

Paper

Paper and pulp mills

Pulp

Thermal conductivity

Water absorption

Fired clay bricks

Leachates

Mandatory requirement

Mineral transformations

Residue

Resources consumption

Technological properties

Waste management strategies

Paper and pulp industry

Brick

Compression Strength

Paper

Thermal Conductivity

Water Absorption