RECYCLING PLASTIC WASTE TO MAKE PLASTIC TILES AND COMPARING STRENGTH WITH CEMENT CONCRETE

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ABSTRACT

Red mud from aluminium industry and Fly ash from the thermal power plant wereregarded as hazardous industry waste all over the world. The present study emphasizes the development of ceramic tiles utilizing red mudand fly ash as raw materials. The bulk density, apparent porosity, wt. loss on sintering, linear shrinkage, water suction, water absorption properties of the developed products are studied carefully.The study showed that tailoring the composition ceramic tiles could be made utilizing up to 50% red mudwhen used along with clay and up to 80% west utilization when used in combination (red mud and fly ashtogether) with clay.

The general objective of this research work was to contribute to the environment decontamination. Its specific objective to develops sustainable roofing tiles from ecological point of view. In this way this technology contribute in the decontainmenation of the environment since it uses waste material that are burned in municipal land without any use , or accumulated and burned in landfill,causing pollution plastic and rubber are non-biodegradable material so nature cannot absorb them as other waste.The typical tiles made from soil or clay will be limited because it destroyed the farmland on the other land the old and tire and plastic increases year and year which brings serious environmental problem so the plastic tiles made from waste plastic will lot to decrease above environmental pressure. The measurement of physical and mechanical properties show that plastic waste tiles whose proportion in plastic 40%give better result than micro-concrete tiles

INTRODUCTION

THE CERAMIC INDUSTRY

Generally the term ‘ceramics’ (ceramic products) is used for inorganic materials (with possibly some organic content), made up of non-metallic compounds and made permanent by a firing process. In addition to clay based materials, today ceramics include a multitude of products with a small fraction of clay or none at all. Ceramics can be glazed or unglazed, porous or vitrified. Firing of ceramic bodies induces time-temperature transformation of the constituent minerals, usually into a mixture of new minerals and glassy phases. Characteristic properties of ceramic products include high strength, wear resistance, long service life, chemical inertness and non-toxicity, resistance to heat and fire, (usually) electrical resistance and sometimes also a specific porosity.

Executive Summary iiCeramic Manufacturing IndustryClay raw materials are widely distributed throughout Europe, so ceramic products like bricks which are relatively inexpensive (but which incur high transport costs due to their weight) are manufactured in virtually all Member States. Building traditions and heritage considerations result in different unit sizes from country to country. More specialised products which

command higher prices tend to be mainly produced in a few countries, which have the necessary special raw materials and
– equally important – traditions of skill and expertise.

KEY ENVIRONMENTAL ISSUES

Depending on the specific production processes, plants manufacturing ceramic products cause emissions to be released into air, water and land (waste). Additionally, the environment can be affected by noise and unpleasant smells. The type and quantity of air pollution, wastes and waste water depend on different parameters. These parameters are, e.g. the raw materials used, the auxiliary agents employed, the fuels used and the production methods: •emissions to air: particulate matter/dust, soot, gaseous emissions (carbon oxides, nitrogen oxides, sulphur oxides, inorganic fluorine and chlorine compounds, organic compounds and heavy metals) can arise from the manufacture of ceramic products •emissions to water: process waste water mainly contains mineral components (insoluble particulate matter) and also further inorganic materials, small quantities of numerous organic materials as well as some heavy metals •process losses/waste: process losses originating from the manufacture of ceramic products, mainly consist of different kinds of sludge, broken ware, used plaster moulds, used sorption agents, solid residues (dust, ashes) and packaging waste •energy consumption/CO2emissions: all sectors of the ceramic industry are energy intensive, as a key part of the process involves drying followed by firing to temperatures of between 800 and 2000 ºC. Today natural gas, liquefied petroleum gas (propane and butane) and fuel oil EL are mainly used for firing, while heavy fuel oil, liquefied natural gas (LNG), biogas/biomass, electricity and solid fuels (e.g. coal, petroleum coke) can also play a role as energy sources for burners.

LITERATURE REVIEW

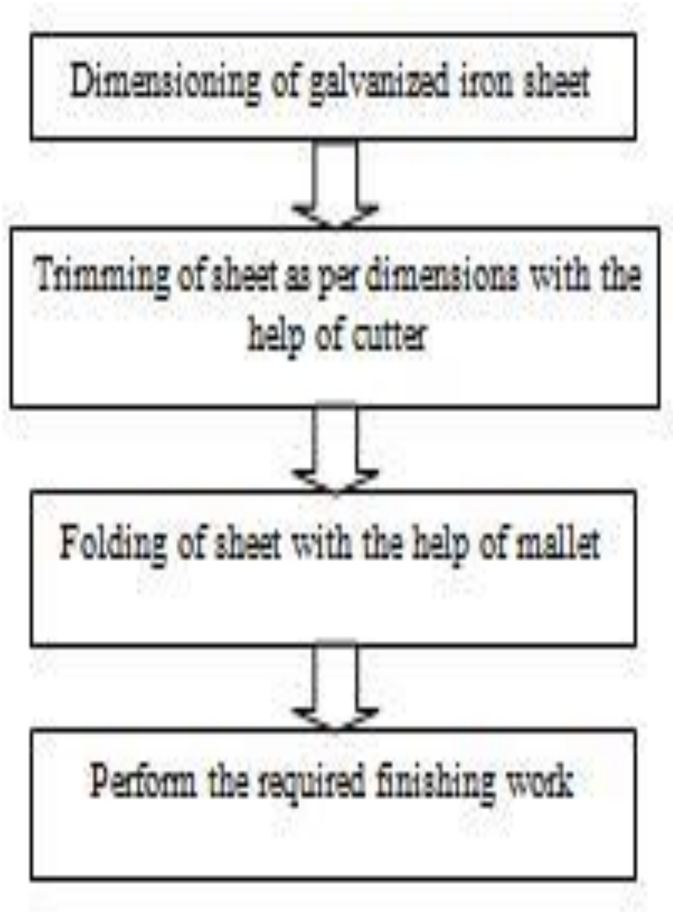
The manufacture of ceramic products takes place in different types of kilns, with a wide range of raw materials and in numerous shapes, sizes and colours. The general process of manufacturing ceramic products, however, is rather uniform, besides the fact that for the manufacture of wall and floor tiles, household ceramics, sanitaryware and technical ceramics often a multiple stage firing process is used. In general, raw materials are mixed and cast, pressed or extruded into shape. Water is regularly used for a thorough mixing and shaping. This water is evaporated in dryers and the products are either placed by hand in the kiln – especially in the case of periodically operated shuttle kilns – or placed onto carriages that are transferred through continuously operated tunnel or roller hearth kilns. For the manufacture of expanded clay aggregates, rotary kilns are used. During firing a very accurate temperature gradient is necessary to ensure that the products obtain the right treatment. Afterwards controlled cooling is necessary, so that the products release their heat gradually and preserve their ceramic structure. Then the products are packaged and stored for delivery.
Executive Summary Ceramic Manufacturing Industry

EMISSIONS AND CONSUMPTIONS

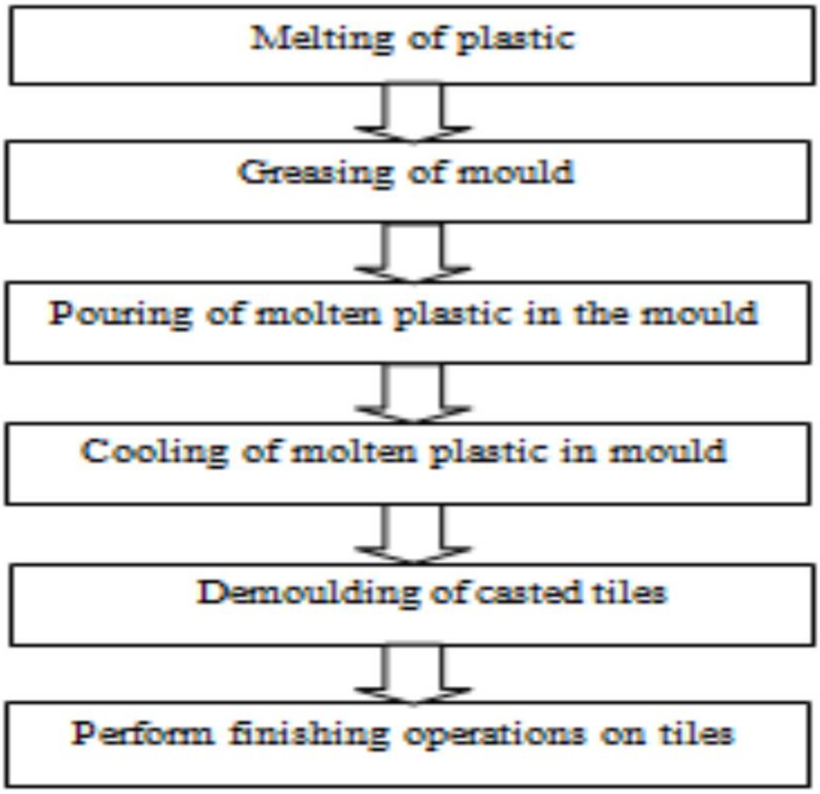
Emissions The processing of clays and other ceramic raw materials inevitably leads to dust formation – especially in the case of dry materials. Drying, (including spray drying), comminution (grinding, milling), screening, mixing and conveying can all result in a release of fine dust. Some dust also forms during the decorating and firing of the ware, and during the machining or finishing operations on the fired ware. Dust emissions are not only derived from the raw materials as described above, but also the fuels contribute to these emissions to air. The gaseous compounds released during drying and firing are mainly derived from the raw materials, but fuels also contribute gaseous pollutants. In particular these are SOX, NOX, HF, HCl, VOC and heavy metals. Process waste water is generated mainly when clay materials are flushed out and suspended in flowing water during the manufacturing process and equipment cleaning, but emissions to water also occur during the operation of wet off-gas scrubbers. The water added directly to ceramic body mixes is subsequently evaporated into the air during the drying and firing stages. Process losses can often be recycled and re-used within the plant due to product specifications or process requirements. Materials, which cannot be recycled internally, leave the plant to be used in other industries or to be supplied to external waste recycling or waste disposal facilities. Consumptions The primary energy use in ceramic manufacturing is for kiln firing and, in many processes, drying of intermediates or shaped ware is also energy intensive. Water is used in virtually all ceramic processes and good quality water is essential for the preparation of clays and glaze slips, clay bodies for extrusion, ‘muds’ for moulding, preparation of spray dried powders, wet grinding/milling and washing or cleaning operations. Avast range of raw materials is consumed by the ceramic industry. These include the main body forming materials, involving high tonnages, and various additives, binders and decorative surface-applied materials which are used on a lesser scale

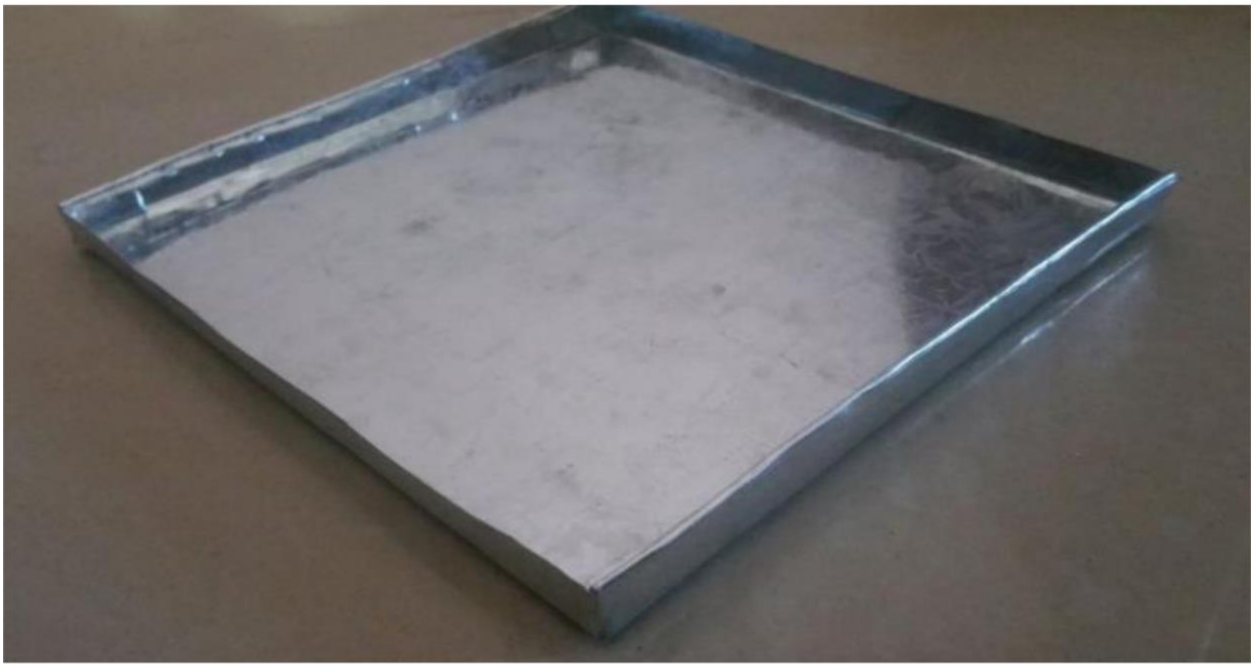
METHODOLOGY

.Preparation of mould-



- Preparation of tiles-





1. PROPOSAL FOR ADHESIVE-

COMPOSITION-

The adhesive to be used further in our project is a chemical mixture of cyanoacrylate ester made in the solvent of acetone or nitro methane.

It is similar to that of **Superglue** or **Dendrit**.

The chemical structure formation of dendrit is a chain polymerization given as below-

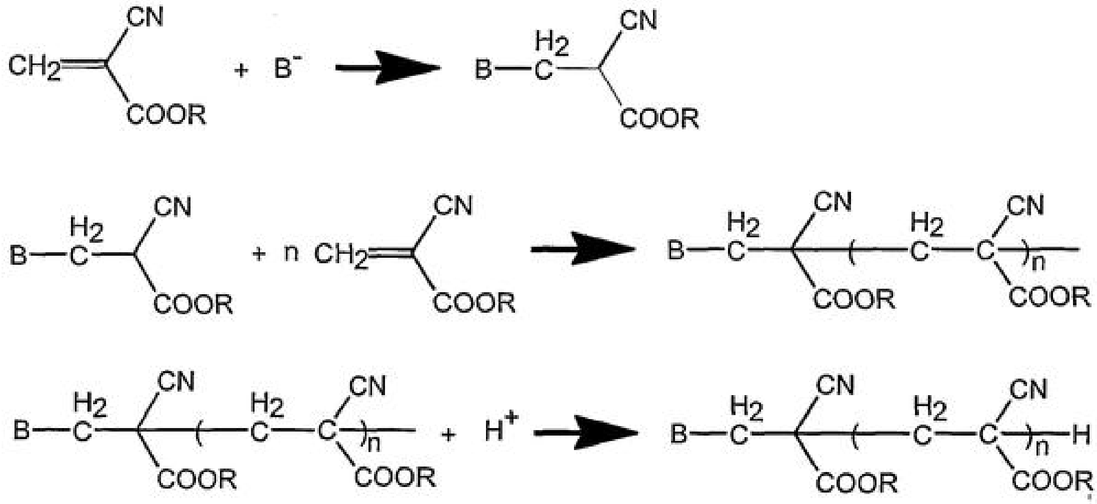


Figure 1 Chemical structure of Superglue

It is a polymer resin.

When it's applied between two surfaces, it forms strong covalent bonds with the surface and binds it together.

2. PREPERATION OF UF RESIN

3.1 Mixing Of Solution first case-

- 10ml formaldehyde solution + 20gm urea powder + 2-3 drops of concentrated sulphuric acid when added together formed a creamy white colored paste.

Fig. Preparation UF Resin

- This solution was later applied to the edges of adjacent tiles for the purpose of joining them together.
- But the idea could not work as the resin lost its liquid type consistency within seconds and became very less workable.

3.2 Mixing Of Solution second case-

- 20ml formaldehyde solution + 20gm urea powder + 2-3 drops of concentrated sulphuric acid when added together formed a creamy white colored paste.

- This paste was later applied to the edges of adjacent tiles for the purpose of joining them together.
- But the idea could not work as the resin lost its creamy consistency within seconds and was converted into powdered form.

3.3 Mixing Of Solution third case-

- 30ml formaldehyde solution + 100gm urea powder + 2-3 drops of concentrated sulphuric acid when added together formed a creamy white colored paste.

- Now, It was not workable for any application

Fig. Liquid form UF sol

3.4 Joining of plastic tiles-

For the purpose of joining of plastic tiles, a mixture of formaldehyde resin and urea solution was used.

Fig. Joining of tile

Fig. Joining of tile

3. Replacement of mould-

Earlier we used mould made from GI sheet on fourth trial was a bit different as we used cast iron mould for moulding and casting our tile.

Fig Round bottom

4.1 Observation

Replacement of mould led to several observations

- It resolved a major drawback of pollution to some extent as the fumes coming out were reduced
- While using GI sheet mould fire was a big problem but this time, this problem was resolved completely as there was greater depth and less exposure to air.

Fig Flat bottom

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