

# **Review of different commercial applications of wastes coming from the TiO<sub>2</sub> NORM industry**

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The present study was conducted to summarize the different applications that the authors have carried out in the valuation of two wastes (red gypsum and ilmenite mud) coming from the titanium dioxide industry located in Huelva, Spain.

Firstly an exhaustive characterization of these wastes was performed in relation to their elemental composition (major, minor and trace elements), radioactive contents, granulometry, mineralogy, microscopic morphology and physical composition, in order to apply this knowledge in the valorization of these co-products in fields such as construction, civil engineering, etc.

The applications studied which we are going to present in this work are follows: Use of red gypsum as a retardant in cement manufacture, as a new fire-insulating material and as a captured agent of CO<sub>2</sub>, use of ilmenite mud in the manufacture of sulphur polymer cement and use of ilmenite mud as an additive in the manufacture of ceramic.

As a main conclusion of our studies, it is possible to indicate the levels of the pollutant elements associated to the final products, in general, within safe limits. Nevertheless, for the specific application of each of these buildings materials, additional studies have been carried out to evaluate their appropriateness for the proposed application, together with specific studies on their health and environmental impact.