

# VitroGeoWaste III

**Study of gypsum wastes as by-products from several quarries examined in the Tabernas desert (Almería, Spain)**

**Oral presentation  / Poster presentation**

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**Abstract:** Several quarries containing gypsum in the Tabernas desert (Almería, Spain) have been examined. The main purpose was to deduce if the samples with lower gypsum content, considered as waste or by-products of gypsum mining, can be applied in construction. The main techniques used in this study to determine the mineralogy, chemical characteristics and morphologies of these samples have been XRD, XRF, FT-IR, physisorption of nitrogen and SEM-EDS. Thermal behaviour has been investigated using DSC-TGA and conventional furnace heating up to 1000 °C. The mineralogical analysis by XRD of these samples indicated that gypsum is the main crystalline phase, showing a relatively low proportion of calcite and quartz, with smectite and muscovite in some samples. FT-IR analysis confirmed these results. Chemical analysis supported the mineralogical results, allowing the determination of trace elements by XRF. It is well-known that Calcium Sulphate dihydrate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ), gypsum, and anhydrite ( $\text{CaSO}_4$ ) are often associated together in nature. Gypsum is the most important commercially. In the present case only gypsum was present according to the XRD and XRF results. Furthermore, heating of these samples showed small exothermic DSC effects (maxima in the range 343-357 °C), being attributed to the transformation of soluble anhydrite into insoluble anhydrite. Gypsum converts to anhydrite via an intermediate mineral, the hemihydrate or bassanite ( $\text{CaSO}_4 \cdot 0.5\text{H}_2\text{O}$ ). It was found important variations in the textural parameters obtained by physisorption when the samples were thermally treated, being associated to the different mineralogy with gypsum contents in the range 69-93 wt. %. This feature will influence the possible applications of these gypsum samples.