



Mineralogical and petrographic characterization of Preguiça and Vila Ruiva mines

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Abstract

This study was performed on the Preguiça and Vila Ruiva mines and aimed at petrographic and mineralogical characterization of various geological media. The Preguiça and Vila Ruiva mines are two examples of the different types of Zn-Pb(-Ag-Sb-Au) deposits that occur in the Ossa Morena Zone, more specifically in the Moura-Ficalho region. Both deposits are in Serra da Preguiça, Beja district, and were explored for Fe-Zn-Pb in the early 20th century and between 1960 and 1966. In Preguiça and Vila Ruiva mines, the old exploration mainly targeted supergene enrichment areas, and information available on the primary mineralisation is scarce. The geology of the Preguiça-Vila Ruiva mining area consists of carbonate rocks that are affected by significant hydrothermal alteration (dolomitization and chertification), essentially composed of dolomite, calcite, and minor ankerite. Recent studies suggest that the Preguiça and Vila Ruiva deposits correspond to very rich secondary Zn-ores located in metadolostones of Lower Cambrian age due to strong in situ oxidation and supergene enrichment processes on previous sulphide mineralisation. Rock samples were collected from the gossans and the host rocks in the spring of 2022. In addition, local soil was sampled from the first 15cm of the soil profile. All rock and soil samples collected from Preguiça and Vila Ruiva were analysed by x-ray diffraction (XRD) and the host rock specimens were further studied using a petrographic microscope. The study of the Preguiça and Vila Ruiva thin sections suggests that the host rocks correspond to dolomitic meta-limestones mainly with granoblastic texture, composed of dolomite, calcite, quartz, and opaque minerals. For the Preguiça mine, XRD shows that the dolomitic meta-limestone has average dolomite contents of ~30%, while Vila Ruiva shows significantly higher contents (~80%) of this mineral. The Preguiça gossan is characterized by significant amounts of willemite (~52%), quartz (~40%), and iron oxides (goethite, hematite, and minor magnetite). Accessory minerals include chalcophanite and anglesite. At Vila Ruiva, the gossan is dominated by iron oxides, mainly magnetite (~33%) and minor hematite (~17%) and goethite (~12%). In this mine, mineral phases such as willemite, chalcophanite and anglesite were not identified. The soils of Vila Ruiva present slightly higher amounts of quartz and lower contents of carbonate minerals than Preguiça soils. However, smithsonite (~12%) was only identified for Vila Ruiva, while cerussite (~3%) was identified only for Preguiça. Hematite is the most abundant iron oxide in the soils of both mines. Although the results suggest some differences in the gossans mineralogy of both mines, the small number of samples analysed largely justify further investigation.

Keywords: x-ray diffraction, petrography, host rock, gossan, soil.