

ENVIRONMENTAL IMPACT OF ACID MINE DRAINAGE ON THE ROȘIA RIVER (ROȘIA MONTANĂ MINING AREA, ROMANIA): A MINERALOGICAL AND GEOCHEMICAL APPROACH

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The development of Acid Mine Drainage (AMD), as a result of the oxidative weathering of sulphides, and the release of Potentially Toxic Elements (PTE) in the environment are one of the main problem affecting the natural watercourses in mining areas (NORDSTROM, 2011).

The studied area is within the Roșia Montană mine site, a hydrothermal gold deposit hosted in andesites and dacites of Neogene age, piercing the prevolcanic sedimentary basement as breccia pipes (WALLIER *et al.*, 2006).

In this study a mineralogical and geochemical characterization of the ochreous precipitates and coupled waters occurring in the Roșia River was carried out in order to evaluate both the mineralogical variations and the PTE partitioning between contaminated waters and secondary minerals. Twelve samples of ochreous precipitates, associated to mine waters and soils were collected starting from the adit of the "Sf. Cruci din Orlea" gallery up to the confluence between Roșia and Abrud Rivers. The mineralogy of the precipitates was determined by means of XRPD, whereas the bulk chemistry by ICP-MS. Temperature, pH and Eh were measured in situ, whereas the chemical analysis on mine waters were made by means of ICP-OES, AAS and chromatography.

Ochreous precipitates consist of a mixture of jarosite and schwertmannite and are characterized by high con-

centrations of PTE (V, Zn, Cd, As, Pb). Moreover a positive correlation between Fe and S with As, V and Pb suggests an effective control of schwertmannite and jarosite on the mobility of specific PTE. Waters flowing from "Sf. Cruci din Orlea" gallery (ASW) are characterized by the lowest pH values and the highest Eh values and PTE contents (Zn, Cr, Cu, Ni, Co, Cd). Soils close to the Roșia River are probably affected by the leakage of ASW, as they show average concentrations of PTE one order of magnitude higher than those of non-contaminated soils (KABATA-PENDIAS & PENDIAS, 2001).

Results show that PTE mobility in precipitates and soils is strongly affected by water pH related to the different geochemical behaviour of elements.

References

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