

MERCURY WITH PAHS: AN ENVIRONMENTAL CRITICAL ASSOCIATION IN THE IDRIA CINNABAR DEPOSIT, SLOVENIA

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Hydrothermal petroleum consisting predominantly of PAHs occur in mercury ores associated with highly thermally stress geological environments, including volcanoes and vents of hydrothermal systems. Understanding of the formation of this mercury - petroleum association has relevant environmental implications as it involves highly dangerous priority pollutants (PAHs and Hg). This association is also well documented in many oil fields. Scarce PAH minerals (e.g. idrialite), which may be consider as end-member of the petroleum - mercury association, occur in mercury ores. In this communication we present first organic geochemical results of the Idrija mercury deposit, Slovenia (12.7 Mt ore with 145,000 t Hg) which is associated with the Scythian-Ladinian aborted rifting and bimodal volcanism. Hydrothermal petroleum and crystals of idrialite occur in the syngenetic ore in the Upper Ladinian bituminous shallow-water sediments and close to the surface vents of hot springs, and in the epigenetic ore as vein fillings. The GC/MS data show decreasing concentration and amount of PAH-homologs in the order: syngenetic ore - epigenetic ore - idrialite. The GC/C/IRMMS data demonstrate increasing carbon isotope ratios differences (1 to 6‰) with the number of benzene rings. These results suggest: (a) different organic sources, or (2) post-depositional fractionation/chromatographic effects during remobilization of the hydrothermal petroleum and re-equilibration of the PAH assemblage at elevated temperature. Further stable carbon isotope data will help to distinguish between these two explanations. The sublimation of Hg explains the high amount of native Hg in air, surface and tailing waters; traces of methylmercury were also detected in these waters.