

## **ORGANIC MATTER ASSOCIATED WITH Zn-Pb ORES FROM THE SILESIA-CRACOW REGION, POLAND**

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The Silesian-Cracow lead and zinc deposits are occurring mainly within the so-called ore-bearing dolomites of the Middle Triassic (Muschelkalk) and by the most authors are classified as Mississippi Valley-type deposits (Sass-Gustkiewicz et al. 1982, Wodzicki 1987, Leach et al. 2001, 2010). Coaly accumulations within the Zn-Pb deposits of the Silesian-Cracow region such as so-called dopplerite – a black, amorphous organic matter (OM) macroscopically resembling gelificated detrital lignite (see Sass-Gustkiewicz & Kwiecińska 1994, Kwiecińska et al. 1997), brown and matte-black intercalations in the clayey rocks of the internal sediment type (Sass-Gustkiewicz 1996) and organic matter present in inclusions of the sulfide minerals (Karwowski et al. 1979, 2001, Kozłowski 1995) are well known, but the problem of their origin is the subject of numerous discussions and to present day has not been clearly resolved. There is an agreement among investigators that the above-mentioned OM has an allochthonous origin, but the controversy raises the question of the potential source of OM and its age (Kołcon & Wagner 1983, Sass-Gustkiewicz & Kwiecińska 1999, Karwowski et al. 2001).

Preliminary tests using gas chromatography coupled with mass-spectrometry (GC-MS) and total organic carbon (TOC) measurements were carried out. First results show that studied samples (dopplerites, internal sediments and sphalerites) from various locations of the Silesian-Cracow Zn-Pb ore districts are organic matter-rich rocks/minerals. Dopplerite OM content varies from 35% to over 50% TOC, internal sediments contain up to 14% TOC, while sphalerites usually have 0.1–0.2% TOC (although there are some samples with over 1% TOC). The contents of total sulfur (TS) are highly variable and depend on the degree of sulfides mineralization. For dopplerites, TS is in the range of 2–8%, while the internal sediments usually containing more sulfur (5–20% TS) because of their association with the ore minerals. The study of coaly matter extracts from the various localities of the Silesia-Cracow Zn-Pb ore districts using GC-MS revealed its immature nature.

Although hopanes distribution differs quite considerably between samples, all of them contain hop-13 (18)-ens, hop-17 (21)-ens and 17 $\beta$ , 21 $\beta$  (H)-hopans compounds typical for an immature OM, unstable in temperature exceeded 50–60°C (Karwowski et al. 2001). It is interesting, that the pilot investigations of OM using pyrolysis and off-line derivatization showed only the presence of small amounts of fatty acids, which did not confirm the proposed origin of these organic accumulations, according to which they were precipitated with humic acids due to the presence of Ca ions (Sass-Gustkiewicz & Kwecińska 1999).

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