

3.6.P08

Organic geochemistry of Ljubija siderite ore deposit, NW Bosnia

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The iron mineralization at Ljubija (NW Bosnia) is hosted by Middle/Upper Carboniferous limestones and shales. The molecular and isotopic analyses of the hydrocarbons (HC) extracted from different generations of carbonates (limestone, ankerite and siderite) give insight into the origin of the fluids and the mixing processes during mineralization. The GC of the saturated HC of all samples are dominated by *n*-alkanes from C₁₁ to C₂₅ and isoprenoids from *i*-C₁₅ to *i*-C₂₀, with $i-C_x/n-C_{x-2} > 1$, and Pr/Ph > 1 (Pr = pristane *i*-C₁₈, Ph = phytane *i*-C₂₀). Mineralized samples (>5 wt% Fe₂O₃) display an unimodal distribution of *n*-alkanes maximizing in the C₁₃-C₁₆ range. The limestones hosting the mineralization display generally bimodal distributions (C₁₃-C₁₆ and C₃₄-C₃₅) and an important envelope of unresolved complex mixture of HC (UCM) eluting between *n*-C₃₀ and *n*-C₄₀. The differences in the HC distribution reflect variations in organic sources (marine vs. terrestrial), and different degrees of thermal maturity and biodegradation partly triggered by incoming hot mineralizing fluids (~240°C from $\Delta^{34}S_{\text{galena-sphalerite}}$). Biomarker HC hopanes and steranes were detected only in the host limestones. The absence of *T_M* and the abundance of *T₅* hopanes suggest mature organic matter. High C₂₇/C₂₉ steranes ratio and high $\beta\beta/\alpha\alpha$ isomers ratio indicate highly mature marine organic matter. In all samples the $\delta^{13}C$ values of the individual *n*-alkanes vary between -29.8 and -25.9‰ across the C-number range, getting isotopically lighter with increasing degree of mineralization. The ¹³C-enriched low molecular weight *n*-alkanes (C_{<17}) may result from hydrous pyrolysis of the local kerogen by the mineralizing fluids. Cracking of longer-chain HC of common marine phytoplanktonic origin by the mineralizing fluid cannot be excluded. The organic geochemical results indicate that the mineralized rocks are stained by a mixture of indigenous (from host limestone) and hydrothermal HC (leached from surroundings shales). The organic geochemical data support the REE distribution and the $\delta^{13}C$ vs. $\delta^{18}O$ covariation of the different Fe-carbonates, which point to hydrothermal replacement of the host limestones by Fe-carbonates [1].

References

[1] Strmic S., Spangenberg J.E., Palinkas L.A. and Borojevic S. (2003) *First Swiss Geosciences Meeting*, 106.

3.6.P09

Organic geochemistry of FanKou super-large Pb-Zn deposit, North Guangdong, South China

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The characteristics of the organic matter associated with limestone-hosted FanKou Pb-Zn deposit, which hosts in the Upper-Middle Devonian and Lower carboniferous formation, have been analysed by element analysis, vitrinite reflectance and gas chromatographic. The host rock of the deposit has abundant carbon with contents of the total organic carbon (TOC) from 0.03%wt to 0.4%wt, and averages at 0.16%wt.

The average content of dissolvable organic matter extracted from unmineralized samples is 53.85ppm and from mineralized is 30.6ppm, while the content of saturated hydrocarbons in dissolvable organic matter from unmineralized samples is 34.54%wt and from mineralized samples is 51.63%wt. So compare to the unmineralized samples, the mineralized samples has higher percent of saturated hydrocarbons, suggesting that during mineralization the indigenous organic matter in ore has been suffered from thermal effect. Gas chromatograms of the saturated hydrocarbons in unmineralized and mineralized samples show that the normal alkanes extracts range from C12 to C30, with two distributions: unimodal (mineralized samples), concentrated around C17, or bimodal (unmineralized samples), with a second maximum centered around C23-25. According to previous study, a rich bacterial population could have given rise in part to the second, high molecular weight, distribution at FanKou ore district. In addition, disappearance of the second maximum concentration of mineralized samples indicated the thermal maturation and hydrocarbon cracking during mineralization, which provided a necessary reduction sedimentary environment to the precipitation of metal. The pristane to phytance ratio is approximately 1, also showing a reduction environment.

Data of the marine vitrinite reflectance (Ro) calculated by the solid bitumen reflectance are 1.92 to 3.55 and most are above 3.0, meanwhile the value of OEP of saturated hydrocarbons is around 1.0, suggesting that the maturation of the organic matter in the host rock is high. According to the metallogenic temperature and the high maturation of the organic matter, it is concluded that the reaction between organic matter and metallogenic element mainly are ion exchange and complexing. By oxidation and reduction, metallogenic element was concentrated and precipitated in such a reduction environment.

This work was financially supported by the Natural Science Foundation of China (No.40172035 and No.40221301).