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鄂尔多斯盆地东北缘侏罗系铀矿化与有机质的某些关联

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摘要：

许多中—新生代盆地沉积充填中铀矿化显著，有机质丰富，铀矿与有机能源同盆共存，铀矿化与有机质内在关联备受关注。鄂尔多斯盆地东北缘东胜—准格尔旗地区侏罗系直罗组下部铀矿化砂岩平均铀含量（128.4×10-6）高出含铀泥岩2个数量级，铀富集成矿以砂岩为主岩并伴随显著的方解石化、高岭石化等低温热液蚀变；铀矿化岩层富有机质，其氯仿沥青“A”中非烃和沥青质占优势，饱和烃/芳香烃比值多大于1，Ⅱ型有机质为主。铀矿化砂岩的有机碳平均丰度（0.47%）比含铀泥岩低1个数量级，前者铀含量与有机质丰度呈负相关，有机质的氯仿沥青“A”含量0.0056%~0.0341%、A/C比值为0.79%~32.34%，处在成熟阶段；而后者铀含量与有机质丰度呈正相关，有机质的氯仿沥青“A”含量0.0049%~0.4937%、A/C比值为0.12%~17.78%，处在未成熟阶段。砂岩中铀富集成矿明显经历了伴随有机质氧化、成熟和分解的晚成岩—后生期含铀热液过程，而泥岩中的铀主要是同生—早成岩阶段粘土有机吸附沉积的。铀矿化砂岩中热液蚀变方解石的δ13CV PDB =-2.7‰~-14.0‰，δ18OV SMOW =18.4‰~20.0‰；热液蚀变高岭石的δ18OV SMOW= 12.6‰~13.8‰，δD(水)V SMOW=-116‰~-133‰，与高岭石平衡流体的δ18O(水)V SMOW =1.8‰~6.1‰，指示含铀成矿热液中CO2主要是有机质氧化脱羟基产物，水来自经过富含有机质地层循环演化了的盆地流体。研究区盆地流体中铀元素在砂岩层内流动和沉淀成矿与地层中有机质的氧化分解相伴发生。

关键词：铀矿化 有机质 岩相学和地球化学 侏罗系 东胜—准格尔旗 鄂尔多斯盆地

Some Relations of Uranium Mineralization and Organic Matter in Jurassic Strata on the Northeastern Margin of Ordos Basin, China Download Fulltext

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Abstract:

Uranium mineralization is commonly associated with organic matter in many Meso—Cenozoic basins, and their intrinsic relationship is an interested subject to many ore deposit researchers. Such relationship is investigated in the uranium mineralized sandstones of the lower part of the Zhiluo Formation (Jurassic) in the Dongsheng—Zhungeer area on the northeastern margin of the Ordos basin. Uranium concentrations in the mineralized sandstones (average 128 4×10-6) are two orders higher than in the uranium bearing shales. Uranium mineralization in the sandstones is associated with hydrothermal calcite and kaolinite. Organic matter is enriched in the mineralized strata and is characterized by dominance of nonhydrocarbon and asphaltene in chloroform bitumen “A” and by saturated hydrocarbon to aromatic hydrocarbon ratios of >1 indicating type II organic matter. The contents of organic carbon in mineralized sandstones (average 0 47%) are one order of magnitude lower than in uranium bearing shales and show a negative correlation with uranium concentrations. The contents of chloroform bitumen “A” of organic matter in the mineralized sandstones are 0 0056%~0 0341% and the A/C ratios are 0 79% ~32 34% indicating that the organic matter is mature. In the uranium bearing shales, the contents of organic carbon are positively correlated to uranium concentrations, the ents of chloroform bitumen “A” of organic matter are 0 0049%~0 4937% and the A/C ratios are 0 12%~17 78% suggesting that the organic matter is immature. Uranium mineralization in the sandstones was associated with late diagenetic—hydrothermal processes accompanied by oxidation, maturation, and cracking of organic matter, whereas uranium in the shales was enriched by absorption with clays and organic matter during sedimentation and early diagenesis. δ13CV PDB and δ18OV SMOW values of hydrothermal calcite range from -2 7‰ to -14 0‰ and 18 4‰ to 20 0‰ , respectively. δ18OV SMOW values of hydrothermal kaolinite are 12 6‰~13 8‰ and those of the parent fluids are calculated to be 1 8‰~6 1‰. δDV SMOW values of the fluids in equilibrium with kaolinite are -116‰~-133‰. These data indicate that the CO2 in the mineralizing fluids was derived from oxidation of organic matter and the water was from circulating basinal fluids that experienced interaction with organic matter. Uranium mineralization resulted from circulation of basinal fluids in sandstones and associated oxidation and decomposition of organic matter.

Keywords:uranium mineralization organic matter petrology and geochemistry Jurassic dongsheng—Zhunge'erqi Ordos Basin

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