

Relationship Between Uranium Mineralization and Hydrocarbon Fluids Characteristics in Paleo-Channel Uranium Deposits of the Central Erlian Basin, Inner Mongolia

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Abstract

Based on analyzing the characteristics of acidolytical hydrocarbon in sandstones of paleo-channel uranium deposits in the Upper Section of Saihan Formation of Lower Cretaceous in central Erlian Basin, the authors investigated the composition, origin and source of hydrocarbons in acidolysis hydrocarbon. Besides, combined with geological characteristics of uranium deposits distribution and enrichment in this area, the authors preliminarily explored the relationship between sandstone-type uranium mineralization and oil-gas in this area. The results show that, in sand body of the Upper section of Saihan Formation, content of CH₄ and C₂⁺ is positively proportional to uranium content, meanwhile, in the oxidation zone, the redox transition zone and the reduction zone, hydrocarbon content develops with obvious zonation. Gas composition characteristic parameters of acidolytical hydrocarbon, i.e., C₁/ΣC, C₁/C₂⁺, C₂/iC₄, C₂/C₃, iC₄/nC₄, iC₅/nC₅, ln(C₁/C₂), and ln(C₂/C₃), show that hydrocarbon gas developed in sand body of the Upper Section of Saihan Formation is organically formed oil-type gas mainly in the high maturity maturation stage, and is mainly composed of crude oil associated gas and crude oil cracked gas. According to geochemical characteristics of source rock and analysis of hydrocarbongeneration and expulsion history, it can be inferred that hydrocarbon gas in paleo-channel uranium deposit developed in upper section of Lower Cretaceous Saihan formation is mainly generated from Lower Cretaceous Aershan Formation (K1ba) lacustrine sapropel or

partial sapropel source rock, followed by 1st section of Tenggeer Formation (K1bt) low mature-mature lacustrine source rock. Main channels for upward escape of deep oil and gas consist of deep faults, unconformity surfaces, main sand bodies or fissures in the study area, in which the deep faults and unconformity surfaces should be the key interest for exploration of sandstone-type uranium deposits in this area. In the process of paleo-channel sandstone-type uranium mineralization in this area, oil and gas play a role in adsorption, reduction and ore-enrichment effect. The mineralization of sandstone-type uranium and oil and gas accumulation evolution are obviously controlled by the inversion developed at the end of Late Cretaceous-Paleocene.

Key words: Hydrocarbon fluid; Sandstone-type uranium mineralization; Characteristics of uranium mineralization; Paleo-channel; Central Erlian basin