Introduction

In north of China, Ordos Basin is the second largest sedimentary basin and is known as “Basin of energy resources” having a great amount of coal, oil, natural gas and many other important mineral deposits especially sandstone hosted uranium deposits. Such type of mineralization occurs in Middle Jurassic Zhiou Formation so chemical compositional analysis performed to find the source of this lithic subarkose sandstone (Cai et al., 2007). Geochemical and mineralogical X-ray diffraction analysis performed to find the mineral alterations of ore bearing strata and host sandstone. Variations in uranium contents in grey green sandstone and grey sandstone of host rocks are studied on the basis of trace element concentrations in both types of sandstones. Geochemistry of uranium deposits, the role of organic matters and hydrocarbons for uranium migrations and mineralization in sandstone have been studied in two main deposits of the Ordos Basin, Dongsheng uranium deposit and Diantou uranium deposit.

Regional Geology and Tectonic Setting of Ordos Basin

Ordos Basin basin is situated in the middle of northern China which is a part of Yellow River drainage basin. This is the second largest sedimentary basin with an area of 250,000 km² and is limited by latitudes 34°00′N to 40°35′ N and by longitudes 106°50′E to 111°10′E, including five provinces, i.e. Gansu, Ningxia, Inner Mongolia, Shaanxi and Shanxi.

The Ordos Foreland Basin was formed as a result of collision of Tethys tectonic field of southwest China and the impact of North China and Yangtze blocks. According to Darby and Ritts (2002), Ordos Basin is an unstable cratonic central basin but according to Hsu (1989), which is not located in a cratonic center and it is surrounded by mountain chain and its subsidence at different stages was related to compressional deformation. Further according to Darby and Ritts (2002) the origin of Ordos Basin can be compare with foreland basin because in both type of basins subsidence is related to thrusting of one part of continental crust under another. Development of Ordos Basin can be devided into different evolutionay stages during the period of Paleozoic to Mesozoic.

Sediments of Ordos Basin starts to deposit on a crystalline basement in Archean to Early Proterozoic time and this depositon ended in Meso- Cenozoic (Table 1). During this time the basin was a part of North China
Craton and a sequence of marine sediments was deposited. In Triassic period after the formation of Ordos Basin, Yangtze Block start to relocate towards north and as result of its crash with the North Chinese Plate, formation of Central orogenic zone occur. Large lake basin of continental type formed as a result of strong twist of Ordos region. This lake basin of continental type is enclosed by orogenic belts: Yinshan and Daqingshan in the north, Qingling in the south, Helanshan in the west and Liuliang uplift in the east (Li et al., 2007).

3 Occurrence of Sandstone Hosted Uranium Deposits in Ordos Basin

In Ordos Basin Mesozoic sedimentary strata is very important for uranium mineralization. As Upper Triassic Yanchang Formation is a high Gamma ray sandstone with uranium rich tuffaceous sediments and the average uranium content for the Yangchang Formation is about 51.1 μg/g (Yang et al., 2010). The Upper Yanchang formation is basically gravel bearing sandstone but large sandstone type uranium deposits in northern Part of China have formed along the margin of Ordos Basin in Jurassic sandstone. The Jurassic strata are composed of Upper, Middle and Lower units but uranium mineralization occur in the Middle unit. As the Lower Jurassic consist Fuxian Formation which is basically a complex of red thick alluvial sandstones. The Middle Jurassic consist Yan'an and Zhiluo Formation. Yan'an is a continental carbonaceous bed while Zhiluo Formation is a complex of variegated sandstone. Uranium is absent in Ending Formation of Upper unit, but in some areas of Upper unit in the Ordos basin this is also absent.

4 Uranium Mineralization in Middle Jurassic

In Ordos Basin although uranium anomalies are detected in different ages but Jurassic period is the most important for uranium mineralization. Large uranium deposits which discovered in Ordos Basin till now, are present in Zhiluo Formation of middle Jurassic age. Zhiluo Formation was deposited during braided and meandering stream system so sediments of this formation are basically fluvial sediments. It is divided into two members on the basis of mode of sedimentary deposition, color, texture, lithology, and oxidation reduction zone and uranium mineralization. These two members are Upper member of Zhiluo Formation (J2Z2) and Lower member of Zhiluo Formation (J2Z1). Lower member (J2Z1) is further divided into Upper sub-member of Zhiluo Formation (J2Z12) and Lower sub-member of Zhiluo Formation (J2Z11). The Upper member (J2Z2) deposited in arid to semi arid climatic condition having high sinuosity meandering stream sediments of variegated color like yellow, purplish red and brownish red medium to fine grained sandstone, massive mudstone, siltstone with intercalation of pelites. The sediments of Upper sub-member of Zhiluo Formation (J2Z12) deposited during low sinuosity meandering stream system. These sediments are grey to greenish grey, medium to coarse grained sandstone with siltstone and pelites while braided sediments of Lower sub member (Y2Z11) are grey color medium to coarse sandstone.

5 Summary

(1) Jurassic strata especially Middle Jurassic are the most important time period for uranium mineralization in lower member of Zhilou Formation in Ordos basin.
(2) Source rocks of the Zhilou Formation are Yinshan Orogenic Belt and Daqingshan area.
(3) The Dongsheng and Diantou uranium deposits have same geologic and mineralization characteristics with different uranium grades, shape of ore body, direction of hydrocarbon movement, mineral alterations and mineralization ages.

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References