1 Introduction

Ordos Basin contains many sandstone-hosted uranium deposits which have been explored intensively, but met difficulties in maintaining stable production. Relations between provenance and basin are important for sandstone-hosted uranium exploration because sand frameworks of contrasting detrital compositions respond differently to diagenesis, and thus display different trends of porosity reduction with depth of burial (Dickinson and Suczek, 1979). Sandstone derived from different source area contains different U content which has different U providing ability in mineralization. In order to discover, describe and evaluate the uranium-rich sandstone, provenance of the sediment rocks must be analyzed. The composition of sandstone is strongly controlled by the parent rock in the source region from which the sediments were derived (Sen et al., 2014). Therefore, the compositions of sandstone can be used as a valid provenance indicator.

2 Geologic Setting

The Ordos Basin, located in the middle of mainland China, is bordered to the east by the Lulian and Zhongtiao Mountains, to the west by the Helan and Liupan Mountains, to the north by the Lang, Yin and Daqing Mountains and to the south by Qinling Mountains (Xue et al., 2010).

Economically important sedimentary uranium ore deposits are hosted by the lower member of the Jurassic Zhiluo Formation. The Zhiluo Formation, which can be divided into the Upper Zhiluo (J$_2$z$^2$) and Lower Zhiluo (J$_2$z$^1$) members, was deposited in a braided stream to sinuous river environment.

3 Sampling Methods

The samples from the Ordos Basin were collected from a series of drill cores which were recovered by Geologic Party NO.208, CNNC from 2012 to 2013. The petrography of 25 sandstones was determined by Sedimentary Laboratory of Research Institute of Petroleum Exploration & Development Huabei Oilfield Corporation Petrochina.

4 Results

Petrographic investigation of the clastic rocks from the J$_2$z$^2$ and J$_2$z$^1$ shows four components: framework grains, cements, matrix and pores. The majority of the framework grains were poor to medium sorted with sub-angular to sub-rounded individual grains and mainly composed by quartz, feldspar, and lithic fragments. Quartz (Q), Feldspar (F) and Lithic Fragment (L) proportions in sandstones were recalculated to 100%. Quartz and feldspar are the most abundant grain components, accounting for 58.0–76.0% of each microscopic sight with an average of 64.84%. The amount of feldspar in the sandstone ranges from 23% to 39%, with an average of 29.1%. Alkali feldspar is very common (18.64% on average), with a much lower plagioclase content (10.48% on average). Metamorphic fragments are predominant lithic fragment type (range from 13 to 27%, 19.44% on average). Matrix is less common (with an average 4.43%) in the samples, and occurs as paste. Quartz cementation is less common (<1%). Calcite and clay minerals are important cements (range 0 to 28%).
5 Discussion and Conclusions

Sandstones from the Zhiluo Formation with medium amounts of quartz and feldspar indicate that the samples belong to arkosic arenite and lithic arenite (Folk, 2014), which indicates that the Zhiluo sandstones were derived from near-source areas. Lithic fragment populations dominated by metamorphic fragments shows that the parent rocks subjected to metamorphic process. The provenance contain characteristic rock types that, when eroded, yield sandstone with a specific compositional range (Dickinson, 1985). The modal data were recalculated on a matrix-free basis to plot on a Q-F-L diagram (Fig. 1). The grain stability and maturity, relief in the provenance, transport mechanism and the source rock composition is emphasized in the Q-F-L plot, which shows that all of the data are in the Dissected Arc provenance field, with all of the members showing a similar distribution pattern. Both of the feldspars are commonly present in significant proportions which reveals that the sandstones drives from felsic rocks which probably afford part U to mineralization in Zhiluo Formation.

In summary, petrographical observation of the J2\textsubscript{z} clastic sediments reveal that: (1) they may have derived from Dissected Arc source, which can provide part U to mineralization in Zhiluo Formation, and (2) in source area, the parent rock might subject to intensive metamorphic process.

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References