1 Rocks of the Black Shale Series

The black shale series in the Qinling Mountains are made up of carbonaceous argillite, carbonaceous siliceous argillite, silicalite, argillite, marlstone, stone coal and carbonaceous limestone. Phosphatic nodules, pyrite and barite are always found in these rocks. Geological and geochemical study shows that the black shale series formed by hydrothermal fluids and biological action in an anoxic environment. The complex metallogenic matter had multiple sources.

2 Characteristics of the Organic Matter

The character of biomarkers indicates that the organic matter derived from plankton, bacteria and algae. The organic component in some samples has the characteristics of advanced plants. Organic carbon in the Qinling black shale series varies from low to high, the content of carbon under tectonic metamorphic rocks is less than that of other black rocks. Black shales in Qinling are lower dissolved hydrocarbons and hydrocarbons originated from kerogen cracking for thermal decomposition in advance.

3 Metallogenic Characteristics

The black shale series of Qinling orogenic belt can be divided into three parts (north belt, middle belt and south belt) in consideration of the geological background, rocks and metallogenic elements combination. The black shales of the Miaowan Formation at the north belt formed infringesea which belongs to an active continental margin, and contains high K, Fe, Al and low Si, variable Na, with TOC ranging from 2.5 to 4.7%. The metallogenic matter is from terrigenous components plus biological components and hot water which is relevant with basalts and granites. The metal association is Mo-Ni-Cu-Pb-Zn-U. A Ni-Mo deposit was found in it. The middle belt of black rock series has more silicalite and variable TOC and lies at the bottom of Shuigoukou Formation which derived from a deep or semideep stagnant fault basin around the paleo-uplift-belt of the Qinling micro-plate. The source belt was like north belt rocks, while hot water matter could only be correlated with basalts. The metal association is Au-V-P-Cu-Pb-Zn-U. Au and V deposits occur in the black shale. The south black-shale belt formed in a fault basin at the continental margin which was made up of the Lujiaping and Banjiuguan Formations, There is more phosphorite, stone coal, barite and witherite while minor volcanic rocks occur in some parts. The source is continental matter, biological components and hot water related with basalts. The metal association is V-Mo-Ba-P-Au and V-Mo-Au-P-Se-C. Barite deposits, witherite deposits and V deposits were found in this belt.

Acknowledgements

This work was strongly supported by friends from No.713 Team, Northwestern Bureau for Nonferrous Geological Exploration, Shangluo. Thanks to them!