Geochemistry of sulfur in Chinese coal

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China is the largest coal producer and consumer in the world and coal is the most important energy source in China. Sulfur is converted to sulfur dioxide during coal combustion and its release into the atmosphere can cause acid rain. We reviewed the data in the literature with regard to the content and distribution of sulfur in coal seams from different coalfields which were deposited in different depositional environments. The forms of sulfur in Chinese coals include pyritic, organic, sulfate, and elemental sulfur. The total sufur is postive to the pyritic sulfur in most Chinese coals.The abundance of sulfur in coals is related to depositional environments of coal seams. In general, coal seams influenced by marine water during the history of peat deposition and coal formation are higher in sulfur than those deposited in nonmarine environments. The trace elements , espical for matel elements, such as As, Cu, Pb, Zn etc. are associted with sufur or pyritic. The mechanism of transformation of sulfur species during coal combustion and its impact on the environment are summarized. Recent studies on sulfur in Chinese coals have significantly improved our understanding about its distribution and origins. China has a vast coal resource and coals were formed in different geologic times and diverse sedimentary environments. Further research in the geochemistry of sulfur in coals from different coalfields is urgently needed in view of the impact of coal combustion on the environment and human health.

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Mineralogical and geochemical features of hydrothermally dissolved carbonate reservoir rocks in Tarim Basin, NW China

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The Ordovician carbonate succession is one of the most important reservoir rocks in the Tarim Basin, North West China. After a long diagenetic process, the primary pore system was almost completely destroyed by compaction and cementation. Therefore the secondary dissolution pores of different geneses are especially important for the carbonate reservoir rocks of Tarim Basin. Hydrothermal dissolution related to strong volcanic/magmatic activities in Permian remarkably and widely develops and produces numerous small dissolution pores, which are crucial for hydrocarbon accumulating, in the carbonate strata. During dissolution, some representative minerals and geochemical imprints were preserved in the carbonates.

Several typical hydrothermal minerals were found along some fractures in the dissolved carbonate reservoir rocks. Instead of occurring individually, two or more minerals usually accompany with each other in a certain position. They can be divided into four mineral assemblages: (1) fluorite-quartz-pyrite, (2) sphalerite-chlorite-calcite, (3) barite-pyrite-siderite-quartz, and (4) pyrite-quartz. The pyrite-quartz occurs most commonly among the four assemblages.

Because of hydrothermal activity, the compositions of the dissolved carbonates changed obviously, including losing of Na and enrichment of Fe, Mn and Si. For limestones, the Na content of the fresh zone is commonly more than 0.1%, and both Fe and Si are less than 0.1%. In comparison, the Na content of the dissolved limestones decreases to less than 0.05%, and both Fe and Si content increase to more than 0.5%. For dissolved dolostones, the average Mg content is 17.23%, lower than that of fresh dolostones, implying that the dissolved had partially dedolomitized; and the Fe and Mn are remarkablely high, with Fe from 2.37% to 7.00% and Mn from 0.79% to 4.89%.

The mineralogical and geochemical signatures will help distinguishing hydrothermal dissolution from other pore-forming mechanisms and predicting pore potential of carbonate reservoir beds.