

论文

山西沁水盆地南部太原组煤储层产出水氢氧同位素特征

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摘要:

为了研究沁水盆地南部太原组15号煤储层及其顶板灰岩的含水特征及水动力条件,从沁水盆地南部柿庄地区采集了煤层气井排出水、矿井下的煤层水与煤层顶板灰岩水、地表水共51个水样进行氢氧同位素及主要离子浓度测定。结果表明:目前排采15号煤的煤层气井排出水是煤层水和煤层顶板灰岩水的混合水。15号煤储层和顶板灰岩裂隙含水层之间存在较强的水力联系,煤层在排水过程中接受灰岩水的大量补给。煤层顶板灰岩裂隙含水层封闭性较差,水在灰岩裂隙中径流速度较快。煤层顶板灰岩水表现出 18O漂移的特点,排采15号煤的煤层气井排出水既表现出18O漂移特点,也表现出D漂移特点,而排采3号煤的煤层气井排出水则主要表现出D漂移特点。煤层气井排出水的δD和δ18O值都与矿化度TDS呈现出一定的正相关性,δD和δ18O值也可以作为判断煤层水径流条件的参考因素。

关键词: 煤层水; 氢氧同位素; 太原组; 沁水盆地南部; 漂移

The hydrogen and oxygen isotope characteristics of drainage water from Taiyuan coal reservoir

Abstract:

To study water features and hydrodynamic conditions of the No.15 Taiyuan formation coal reservoir and its roof limestone in the southern Qinshui basin, this paper collected 51 water samples from the river, coal bed methane well drainage, coal reservoir and its roof limestone in the South Shizhuang region. Measurements of hydrogen and oxygen isotope and main ion concentration in the water samples show that the water discharged from CBM wells is a mixture of coal seam water and roof limestone water. The No.15 coal seam has a strong hydraulic connection with the roof limestone fracture aquifer, and receives substantial recharge from roof limestone water. The sealing ability of the roof limestone fracture aquifer is weak, and the runoff speed of water in the limestone fracture is fast. Roof limestone water demonstrates a drift of 18O, and the water that is discharged from the CBM wells of the No.15 coal seam has the drift of both of 18O and D. At the same time, water discharged from the CBM wells of the No.3 coal seam mainly demonstrates a drift of D. All the water discharged from the CBM wells present a positive correlation with salinity (TDS), and the data of δD and δ18O can be used as reference factors for judging the runoff conditions of coal seam water.

Keywords: coal seam water; hydrogen and oxygen isotope; Taiyuan formation; southern Qinshui Basin; drift

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