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## Study on CO<sub>2</sub> Geological Storage Suitability Evaluation in Qinshui Coalfield Based on Uncertainty Measure Theory

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In human life, fossil fuels such as coal, oil, natural gas etc are used to cause CO<sub>2</sub> content in the atmosphere is significantly increased, leading to global warming, the survival of human and sustainable development of society economy pose a serious threat, how to reduce CO<sub>2</sub> emissions to the atmosphere has become a major human problems. In order to actively promote the reduction of CO<sub>2</sub>, United States, Canada and European countries etc carry out the related research and engineering practice for CO<sub>2</sub> geological storage technology in the past 10 years, showing good prospects. In order to cope with global climate change, China has actively participated in action controlling the emission of CO<sub>2</sub> in international community, is actively exploring the CO<sub>2</sub> emission reduction measures. At present, the most ideal CO<sub>2</sub> storage sites are deep salt layer, the oil and gas field depleted or mining into the later stages, and barren coal not mining and marine(Zhang Senqi et al., 2011; Xu Jun et al., 2005; Zhang Wei et al., 2006). Due to different storage places, the respective CO<sub>2</sub> storage mechanism is not also the same.

Qinshui Basin is located in the southern Shanxi uplift, basin is like oval, long axis is along north-north-east direction extension, north-south is 300km long, east-west is 150km width, the area is  $4.2 \times 10^4 \text{km}^2$ . In Qinshui Basin, coal and coalbed gas are rich in resources, generally including 7 coalbeds, the average thickness of coalbed is 8-17m, coal has simple structure, stable caprock, and wide distribution area, is a good area of CO<sub>2</sub> geological storage, storage potential is great(Zhang Jianbo et al.).

According to uncertainties choosing ideal CO<sub>2</sub> storage sites, this paper made earth system science theory as a guide, studied index condition of CO<sub>2</sub> geological storage

suitability in Qinshui coalfield, fully considers the element of each respect, used information entropy and unascertained measure theory, built comprehensive evaluation model of CO<sub>2</sub> geological storage suitability in Qinshui coalfield. Starting from practical geologic condition, 23 factors that influence CO<sub>2</sub> geological storage suitability were taken into account, and uncertainty measure function was obtained based on the in-situ data. The uncertainty problems in evaluation of CO<sub>2</sub> geological storage suitability were solved by qualitative analysis and quantitative analysis respectively. Information entropy theory was used to calculate the index weight of factors, credible degree recognition criteria was used to judge rank of CO<sub>2</sub> geological storage suitability in Qinshui coalfield. The results show that uncertainty measure method is reasonable and can provide certain reference significance for CO<sub>2</sub> geological storage suitability evaluation in the future.

**Key words:** Qinshui coalfield, uncertainty measure, comprehensive evaluation, CO<sub>2</sub> geological storage

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