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# Evolution of Pore Structures of In-situ Oil Shale Pyrolysis Through Superheated Steam

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In-situ recovery of oil shale is an internationally recognized clean and efficient technology for extraction kerogen from oil shale. The technology- in-situ inject superheated steam into oil shale to exploitate its kerogen, is a totally new technology proposed by Taiyuan University of Technology. In the process of in-situ pyrolysis and oil gas exploration of oil shale, pores and fractures of oil shale are not only the seepage channels of injected hot fluid to reach interior of oil shale, but also the passages of the outflow of pyrolysis products to the production wells. Thus, Evolution characteristics of pore and fracture of oil shale are the key to the success of oil shale in-situ mining. A pilot study of large size (1700*1400*1000mm) oil shale in-situ mining is conducted by Taiyuan University of Technology in 2015~2016, proving the feasibility of in-situ mining. In this study, the pore characteristics of oil shale samples located in different zones between injection and production wells are measured and statistics. The results show:

1）Porosity both along the direction of horizontal bedding plane and the direction of perpendicular of bedding plan are greater than the initial oil shale porosity, 1.5%, while in horizontal the porosity exceeds 27.65% and in vertical the porosity is more than 26.08%. It shows that the superheated steam has great impact on the pore structure evolution.

2）After the pores being divided into four grous-micropores, small pores, mesopores and macropores according to the pore size, one can find along bedding planes, the proportion of four pore groups is varied as mesopore>small pore>macropore>micropore. The proportion of mesopore is the largest and is the most significant to total pore structure;

3）In the whole pyrolyzed zone in the sample, oil shale with porosity among 23%~31% sums up to 75%. The results compared to oil shale after direct pyrolysis by heat, the porosity is only about 20%,shows validating the feasibility of convection heating of oil shale.

## References

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**Primary authors:** YANG, Dong (Taiyuan University of Technology); Dr KANG, Zhiqin (Taiyuan University of Technology); Dr WANG, Lei (Taiyuan University of Technology)

**Presenter:** YANG, Dong (Taiyuan University of Technology)

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