



High voltage-power frequency electrical heating in-situ conversion technology of oil shale

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With the depletion of conventional energy sources, oil shale has got much attention as a new type of energy resource, which is rich and widespread in the world. The conventional utilization of oil shale is mainly focused on resorting to produce shale oil and fuel gas with low extraction efficiency about one in a million due to many shortcomings and limitations. And the in-situ conversion of oil shale, more environmentally friendly, is still in the experimental stage. High voltage-power frequency electrical heating in-situ conversion of oil shale is a new type of in-situ pyrolysis technology. The main equipment includes a high voltage-power frequency generator and interior reactor. The high voltage-power frequency generator can provide a voltage between 220-8000 V which can be adjusted in real time according to the actual situation. Firstly, high voltage is used to breakdown the oil shale to form a dendritic crack between two electrodes providing a conductive channel inside the oil shale rock. And then the power frequency (220V) is used to generate the electric current for heating the internal surface of conductive channel, so that the energy can be transmitted to the surrounding oil shale. When the temperature reaches 350 degree, the oil shale begins to pyrolysis. In addition, the temperature in the conductive channel can be extremely high with high voltage, which makes the internal surface of conductive channel graphitization and improves its heat conduction performance. This technology can successfully make the oil shale pyrolysis, based on a lot of lab experiments, and also produce the combustible shale oil and fuel gas. Compared to other in-situ conversion technology, this method has the following advantages: high speed of heating oil shale, the equipment underground is simple, and easy to operate; it can proceed without the limitation of shale thickness, and can be used especially in the thin oil shale reservoir; the heating channel is parallel to the oil shale layers, which has more effective area for heating and heat transmitting; it has very good adaptability to the formation, the location and depth of the electrodes which can be adjusted according to the specific stratigraphic depth case; A positive(negative) electrode can be connected to multiple negative(positive) electrodes, and the arrangement of the positive and negative electrodes can be evaluated for improving the extraction efficiency. High voltage-power frequency electrical heating in-situ conversion technology is a very promising in-situ pyrolysis method, which could provide a new way of mining oil shale resources.