Diversity of culturable acidophiles in a uranium in-situ bioleach site

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The unconventional mining technique of in-situ leach (ISL) has been applied in the uranium recovery worldwidely since 1960's[1]. Now acid in-situ leach is widely used in sand stone uranium ores in China with low cost and less workforce. With the increasing of low-grade uranium ores, uranium recovery decreased greatly. In-Situ bioleaching is becoming a prefered technique to solve the problems. Microbial diversity is one of the key issues for the commercial application.

Taking an In-Situ bioleaching test in a uranium deposit as an example, several strains of acidophiles such as *Athidithiobacillus* sp., *Leptospirrillum ferrooxidans*, *Sulfobacillus* sp. and *Acidimicrobium* sp. were isolated from the leachate, raffinate and minerals of bore holes by 4 selective media, purified by agrose double layers plate and identified by 16S rDNA PCR and sequencing. Plates culture showed that the dominant bacteria in the leachate were *A. ferrooxidans* and *L. ferrooxidans* at the first period of bioprocess when no organic substances accumulation. With the process carried on, facultative heterotrophiles in leachate increased for the biomass accummulated with raffinate recycled. And with ferric ion concentration increased in the oxidation tanks, *L. ferrooxidans* became the dominant bacteria than that of *A. ferrooxidans*.

As a consequence, the cultureable acidophilies are more divers in the In-Situ bioleaching system and the acidophilic communities changed with processing and the leaching factors, such as temperature, pH value, Eh value and chemical components (Fe^{2+}/Fe^{3+}). This study will provide a basis for the acidophilic distribution, improvement of the oxidation activity and bacteria regulations in the processing of uranium In-Situ bioleaching.

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[1] Gaivn M. mudd. *Environmental Geology* (2001) **41**:404-416.