Iron oxidizing shifts relating with extreme acidophiles. Different concentration of organic matter altered iron oxidizer and affected its efficiency in pyrite oxidizing process

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As one of the most abundant metal in the earth, the geochemical iron cycle has always been concerned. Meanwhile, many evidences indicated that microorganism played an important oxidation role during this geochemical process, and received broad and significant attention. The micro- iron oxidizer, which could promote oxidation of pyrite via metabolic activities at low pH, are chemoautotrophic acidophiles and have an obligate requirement for organic matter. To determine the effect of organic matter on pyrite bio-oxidation, high (0.2% yeast extract) and low (0.02% yeast extract) concentration of organic compound were supplied to pyrite bio-oxidation microbial community. The data revealed that proportion of mixothrophic iron-oxidizing species, *Sulfobacillus thermotolerans*, increased from 2% to 75% at the end of reaction in high concentration group. The result of maximal concentration of total iron showed 12.7% reduction compared with untreated group. About 46% of TOC (total organic carbon) was consumed. High TOC altered metabolic characteristics of *S. thermotolerans*. In low concentration group, leaching efficiency of iron in pyrite was improved and no TOC consumption observed. Production of total iron was faster and higher which indicated low concentration of yeast extract amplified iron oxidation efficiency of *S. thermotolerans*. Organic matter influenced biological-induced iron oxidation by altered iron oxidizer metabolism activity. This phenomenon gives a complementary explanation for the oscillations of bacteria concentration for the iron cycle.