

## **AUTHIGENIC MAGNETITE FORMATION BY THE THERMOPHILIC Fe(III)-REDUCING PROKARYOTES.**

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The origin of Iron Banded Formations is sometimes considered to be connected with bacterial activity. As these formations are in most cases associated with volcanic areas, we studied the possible role of thermophilic bacteria in formation of iron minerals. Anaerobic Fe(III)-reducing enrichment cultures were obtained from samples of Kamchatka and Kurils hot springs (T 60-65, pH 7.0). Hydrogen and acetate - energy substrates, available in hydrotherms - were used as electron donors, whereas amorphous Fe(III)-hydroxide served as electron acceptor. Transformation of solid phase was studied by means of x-ray diffractometry, messbauer spectroscopy and scanning electron microscopy. Both with hydrogen and acetate, microbial growth occurred during 2-5 days. It was accompanied by Fe(III) reduction and magnetic precipitate formation. However, in hydrogen-utilizing culture x-ray amorphous substance was formed with the minor magnetite reflection. After two months maturation the precipitate had a distinct magnetite reflection and messbauer spectroscopy revealed formation of magnetite with disorder crystalline structure. With acetate as substrate, magnetite was formed during microbial growth. Magnetic phase contained larger skeletal magnetite crystals, sometimes forming twins. Thus, our experiments confirmed that thermophilic microorganisms might cause formation of iron ores in volcanic environment, using electron donors available in hydrotherms. This work was in part supported by grant 98-05-65267 from Russian Foundation for Basic Research.