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Sulfate-Reducing Bacteria (*Desulfovibrio desulfuricans*) activity monitored by magnetic measurements in Bure claystones (France)

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With modern magnetic equipment, we may detect subtle variations of iron and sulphide oxides within few ppb that may occurred during biological activity. Using magnetic measurements, we monitor the activity of *Desulfovibrio desulfuricans* bacterial strain (SRB) in claystones for 8 months. Our experimental procedure permits to have the contribution of both initial magnetic grains and newly magnetic grains.

Action of bacteria as radionucleides transit and/or transformation vector is one of the major research trend in stocking radioactive wastes. Within the excavated damaged zone (EDZ) of the galleries human activity leads to rapid weathering of iron sulphides such as pyrite (FeS2) in the host rock. Under the joint action of oxygen and water, many sulphides are produced. In addition, organic matter ($\sim$1%) and anaerobiotic micro-conditions may favour the development of SRB species.

Five *in vitro* experiments at 32˚C have been performed on callovian-oxfordian claystones from the Paris basin (Bure, France). Theses rocks were previously heated at 95˚C for 55 days to obtain sulphides.

Magnetic remanence and bacteria growth were measured at regular intervals. After about one month of cultivation, the comparison between SRB-rich and SRB-free samples shows different magnetic patterns. While SRB-free samples display little variations (less than 10%) , SRB-rich samples show first a drop of magnetization (up to 90%). According to other data, this drop corresponds to the bio-transformation of iron sulphides. After this initial drop, we see an increase of magnetization. This increase corresponds to the input of new magnetic minerals.

We show: 1) that SRB can live continuously in natural claystones in our experimental procedure; 2) that mineralogical transformation are related to the SRB metabolism 3) Our method is appropriate and efficient to follow the kinetics of these transformations.