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# Definition of a specific growth medium for *Acidithiobacillus thiooxidans* to measure the alteration rate of nuclear glass

M.Bachelet (1), J-L.Crovisier (1), S.Vuilleumier (2), R.Boutin (1), V.Geoffroy (2)

(1) Ecole et Observatoire des Sciences de la Terre, Centre de Géochimie de la Surface, UMR 7517, 1 rue Blessig 67000 Strasbourg, France

(2) Génétique Moléculaire, Génomique, Microbiologie, Université Louis Pasteur, UMR 7156 , 28 rue Goethe, 67083 Strasbourg Cedex, France

mickael.bachelet@illite.u-strasbg.fr

Unravelling the effects of microorganisms on materials in the natural environment is complicated by the fact that comparable observations under similar but sterile conditions are not available. Another difficulty is the choice of reliable tracers to evaluate the alteration rate of materials in laboratory experiments. Elements useful for experimental study should be good tracers of alteration rates, implying that they should not be complexed with other constituents in the medium (calcium, boron, strontium or lithium).

Our objective is to evaluate the influence of *Acidithiobacillus thiooxidans* on the alteration rate of materials, by measuring the flux of elements from the solid to the liquid phase. Towards this goal, a new bacterium-specific growth medium was designed, which allows both bacterial growth at 25˚C in the presence of silicates, and the detailed chemical analysis of solution resulting from the alteration of materials associated with the growth process.

Ultrapure reagents where used to introduce P, $NH_4$, Ca, K and S in the solution to fit the requirements of analysis of trace and ultra-trace elements by ICP-MS ($<$ 1g/L). This growth medium allows to measure strontium concentration in the ppb range. In

this medium, bacteria reach the end of exponential phase of growth after 15 days.

Experiments were conducted during two months and the solution was renewed every two weeks for analysis. For nuclear glass, concentrations in solution reached 510 ppb and 6.7 ppm for Sr and Ca, respectively, which corresponds to an apparent rate of 1.5 $10^{-6}$ g/m$^2$/d.

Comparative experiments under abiotic conditions are in progress.