Effect of electron donor on green rust formation by *Klebsiella mobilis*, a nitrate-reducing bacterium

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Green rusts (GRs) are mixed Fe(II)-Fe(III) hydroxides with a high reducing activity towards organic/inorganic pollutants. They can be produced from ferric-reducing or ferrous-oxidizing bacterial activities [1, 2]. Recently, we discovered that nitrate-reducing bacteria (NRB) can also be involved in the GR formation by an indirect process where biogenic nitrite oxidizes Fe(II) [3]. *K. mobilis*, used in this present study as a model of NRB, is able to reduce nitrate to nitrite using an organic carbon source as electron donor, but is unable to enzymatically oxidize Fe(II) species. During incubation, the formation of GR and/or goethite (α-FeOOH) occurred as secondary iron minerals depending on the concentrations and the nature of organic electron donor. GR appeared as a transient iron mineral resulting from Fe(II) oxidation by nitrite produced *via* bacterial respiration of nitrate (Fig. 1).

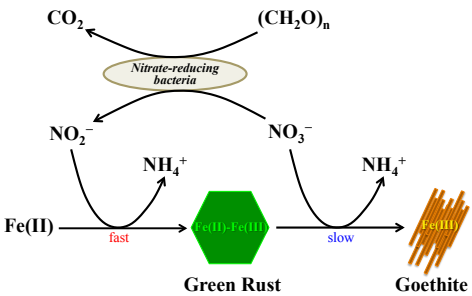

Figure 1: Formation of GR by nitrate-reducing activity.

The formation of GR from Fe(II) oxidation by biogenic nitrite can provide a direct link between the biogeochemical cycles of nitrogen and iron, in particular in anoxic and oligotrophic environments. NRB should now be considered as a new player in the GR formation.

[1] Jorand *et al* (2013) *Geomicrobiol. J.* **30**, 600-615 [2] Pantke *et al* (2012) *Environ. Sci. Technol.* **46**, 1436-1446 [3] Etique *et al* (in revision) *Environ. Sci. Technol.*