

# EFFECT OF SODIUM AZIDE (NaN<sub>3</sub>) ONTO TRACE ELEMENTS' MOBILITY DURING LABORATORY RESUSPENSION EXPERIMENT

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## Abstract

The intrinsic effect of NaN<sub>3</sub> onto trace element's mobility was studied during a laboratory resuspension when sediment was mixed with seawater. It was shown that NaN<sub>3</sub> influenced the TME's transfers between sediment and seawater. As a conclusion NaN<sub>3</sub> should not be used in experiment when sediment is mixed with seawater.

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Dissolved trace metallic elements (TME) can bind to a solid phase (sediments, colloids) (Cappuyns and Swennen, 2005) which will eventually settle down to sediments (Pía Di Nanno et al., 2007; Ye et al., 2013). Nevertheless, sediment can be resuspended and become a major source of contamination. In order to evaluate the biotic and abiotic contributions in the remobilization processes, a microbial community inhibitor which do not contaminate in TME, do not complex them and not modify the organic matter is needed. In this context sodium azide (NaN<sub>3</sub>), a strong poison commonly used in biogeochemistry, is often used to prepare abiotic controls in sediment resuspension experiments (e.g. Cabrol et al., 2017; Shipley et al., 2011; Zouch et al., 2018). Nevertheless, the intrinsic effect of NaN<sub>3</sub> onto TME transfer between water and sediment was never studied.

To understand the intrinsic effect of NaN<sub>3</sub> onto TME mobility, a laboratory resuspension experiment was performed consisting in mixing in trace-metal clean teflon bottles sediment (collected with a grab) to seawater collected at the same site (Toulon Bay, NW Mediterranean Sea, France). Sediment were autoclaved and seawater was filtered under 0.2µm in order to sterilized both media and inhibit biotically mediated transfers. NaN<sub>3</sub> was added to seawater at concentrations ranging from 1 to 50mM along with a NaN<sub>3</sub>-free control. Then sediment was added to the seawater with a ratio of 50g/L and the mixture was submitted to head-over-shaking during 2 weeks.

Samples were collected after 1 day and 2 weeks of contact times. They were filtered on 0.2µm (Sartorius) before being analyzed. TME concentration was assessed by HR ICP-MS, dissolved organic carbon (DOC) concentration was obtained with a TOC-VCSH (Shimadzu) and particulate organic carbon (POC) concentration was acquired by a NC Soil Analyzer Flash 200 (Thermo Fisher Scientific). Furthermore, pH and Eh were measured at the beginning and at each sampling dates.

The obtained results demonstrated that NaN<sub>3</sub> significantly modified TME transfers, the remobilization amplitude being dependant on NaN<sub>3</sub> concentration. For example, after two weeks of contact time dissolved lead concentration were lower when NaN<sub>3</sub> concentration increased whereas dissolved Cu concentration increased with NaN<sub>3</sub>. This difference of behaviour between Cu and Pb could be explained by their respective affinities with the dissolved phase, associated DOC transfers and pH/Eh modifications. The influence of their adsorption/desorption kinetics (Dang et al., 2015; Monnin et al., 2018) also partly explained our observations.

As a conclusion, NaN<sub>3</sub> should not be used in experiment, when sediment is mixed with seawater, to explain TME transfers as it has itself a strong impact onto the mobility of TME.

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