

# Technology-Critical Elements (Sb, Ta, Te, In, Ga) and organic matter interactions by fluorescence quenching

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The trace elements studied are considered as key components for the development of new technologies. For most of them, the present understanding of their speciation in the presence of natural organic matter (NOM) is scarce and/or contradictory, and few experimental data are available. Their biogeochemical cycles and potential biological and human health threats need to be further explored.

This work consists in performing a series of fluorescence quenching experiments [2] in solutions containing standardized extracted NOM and rare metals (Sb, Ta, Te, In, Ga) at different pH values to measure their association constants and the number of complexing sites per unit of carbon. The experiments are carried out by 2D / 3D fluorescence spectroscopy, UV-Visible and, when possible, time resolved fluorescence spectroscopy. The total luminescence spectra are treated using the CP/PARAFAC algorithm that allows the modelling of fluorescent components that can be processed independently [3].

Binding constants are obtained from the quenching results with a discrete complexation model [3,4].

The very few data found in the literature are completed by these evaluations of the interactions by fluorescence quenching. A comparisons is also done with the theoretical [4] or experimental [5] values.

[1] Ryan & Weber (1982) *Analytical Chemistry*, **54**(6), 986–990. [2] Mounier et al (2011) *Biogeochemistry*, **106**(1), 107–116. [3] Omanović et al (2010) *Analytica Chimica Acta*, **664**(2), 136–143. [4] Pourret et al (2007), *Chemical Geology*, **243**,128-141. [5] López-García et al (2017) *Talanta*, **162**, 309-315.