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CHARACTERIZATION OF IRON-POLYPHENOLS COMPLEXES IN SEAWATER

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Abstract: Marine microorganisms like microalgae, can produce organic ligands with the capability to complex trace metals in the ocean such as iron (Fe) and copper (Cu). Among all the possible organic compounds, polyphenols have been measured and identified in the exudates of marine microalgae such as *Phaeodactylum tricornutum* and *Dunaliella tertiolecta*. Among all these polyphenols, catechin, sinapic acid, gallic acid and gentisic acid have been studied in terms of Fe complexation via kinetics of formation (k_f) and dissociation (k_d).

The k_f of these organic ligands was $1.2x10^4$ - $4.2x10^5$ M^{-1} s^{-1} and k_d was $1.8x10^{-4}$ - $4.4x10^{-4}$ s^{-1}. Therefore, the conditional stability constant (log $K'_{Fe'L}$) was from 7.8 to 9.2. Then, these polyphenols can be considered weak ligands (L2-type).

These results demonstrated that the microalgae can excrete functional groups to complex Fe in seawater, increasing its solubility and keeping for longer in solution. This work improves our knowledge about the Fe biogeochemical cycle and characterizes the pool of organic matter in terms of interactions with Fe.

Keywords: Complexation, organic ligands, polyphenols, iron, ocean, biogeochemical cycle

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