

## THE EFFECTS OF ORGANIC MATTER CHARACTERISTICS ON FE(II) OXIDATION KINETICS IN COASTAL SEAWATER

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**Abstract:** The iron (II) oxidation kinetic process was studied at 25 stations in coastal seawater of the Macaronesia region (9 around Cape Verde, 11 around the Canary Islands, 5 around Madeira). In a physicochemical context, experiments were carried out to study the pseudo-first order oxidation rate constant ( $k'$ , min<sup>-1</sup>) over a range of pH (7.8, 7.9, 8.0, 8.1) and temperature (10, 15, 20, 25°C). Deviations from the calculated  $k'_{cal}$  at the same T, pH and S were observed for most of the stations. Measured  $t_{1/2}$  ( $\ln 2/k'$ , min) values at the 25 stations ranged from 1.82-3.47 min (mean  $1.93 \pm 0.76$  min) and for all but two stations were lower than the calculated  $t_{1/2}$  of  $3.21 \pm 0.2$  min. In a biogeochemical context, nutrients and variables associated with the organic matter spectral properties (CDOM and FDOM) were analyzed to explain the observed deviations. The application of a multilinear regression model indicated that  $k'$  can be described ( $R=0.921$ ,  $SEE=0.064$  for pH=8 and T=25°C) from a linear combination of three organic variables.

$$k^{OM} = k'_{cal} - 0.11 * TDN + 29.9 * b_{DOM} + 33.4 * C1_{humic}$$

where TDN is the total dissolved nitrogen,  $b_{DOM}$  is the spectral peak obtained from colored DOM analysis when protein-like or tyrosine-like components are present and  $C1_{humic}$  is the component associated to humic-like compounds obtained from the parallel factor analysis (PARAFAC) of the fluorescent DOM. Results show that compounds with N in their structures principally explain the observed  $k'$  increase for most of the samples. Although other components could also present a relevant role. Experimentally,  $k'$  provides the net result between the compounds that accelerate the process and those that slow it down.

**Key words:** Iron(II), oxidation kinetics, coastal waters, CDOM, FDOM.