

[KN 2.3]**Copper(II)/Copper(I) in Natural Systems
(Ligands that can stabilize copper(I))****M.L.S. Simões Gonçalves**

Centro de Química Estrutural, Instituto Superior Técnico, Av. Rovisco Pais, 1049-001 Lisboa, Portugal

The role of trace elements in environmental and biological processes depends on their speciation, that is a key to a better understanding of natural mechanisms.

However, speciation is a complex problem that requires several approaches such as:

1. 'In situ' and direct determinations
2. Determination of thermodynamic and/or kinetic parameters, in well-defined and heterogeneous systems, that can be used in computer simulations

In particular, discrimination between oxidation states of the same element is important, e.g. of Cu(II)/Cu(I), in order to understand the role of this redox pair in the environment. In this context, voltammetric methods are very adequate, since copper(I) can be produced at the interface if there are ligands in solution that can preferentially stabilize this cation.

So, first of all, voltammetric methods have been used for studying the couple copper(II)/copper(I) in media with well-defined ligands. Afterwards, titrations of samples from a river, in more or less pollutant places and in different times of the year, have been done with copper(II) and followed by DPASV. Copper(I) seems to be stabilized in certain conditions, which means that it can be formed in the medium and detected during the time scale of the technique of about 50 ms.

References

- [1] GONÇALVES and SANTOS (1983): JEC **143**, 397
- [2] GONÇALVES, SIGG and STUMM (1991): Electroanalysis **3**, 553
- [3] XUE, GONÇALVES, SIGG and STUMM (1991): Env. Sci. Technol. **25**, 1716
- [4] SANTOS and GONÇALVES (1991): Electroanalysis **3**, 131
- [5] BOTELHO, BOAVENTURA, GONÇALVES: Env. Sci. Technol. Submitted

[KN 2.4]**Organic Complexation of Biogenic Metals in Ocean Waters****C.M.G. van den Berg**

Oceanography Laboratories, Liverpool University, Liverpool L69 7ZL, UK

Biogenic metals include iron, cobalt, zinc, and copper. By their very nature these metals are essential to marine microorganisms and could in some conditions limit growth. It is no coincidence that these elements are very reactive and form complexes readily, as well as stable organic compounds involving covalent bonding. It is interesting, and perhaps initially counterintuitive, that microorganisms apparently release ligands into the surrounding seawater which complex these

metals, and which can make the metals either less available or more available, depending on the conditions and the metal.

The complexation of these important biogenic elements by ligands in the water will be discussed in this talk, and attempts will be made to compare this to the complexation inside the microorganisms. Recent oceanic data on cobalt, zinc and copper will be included.