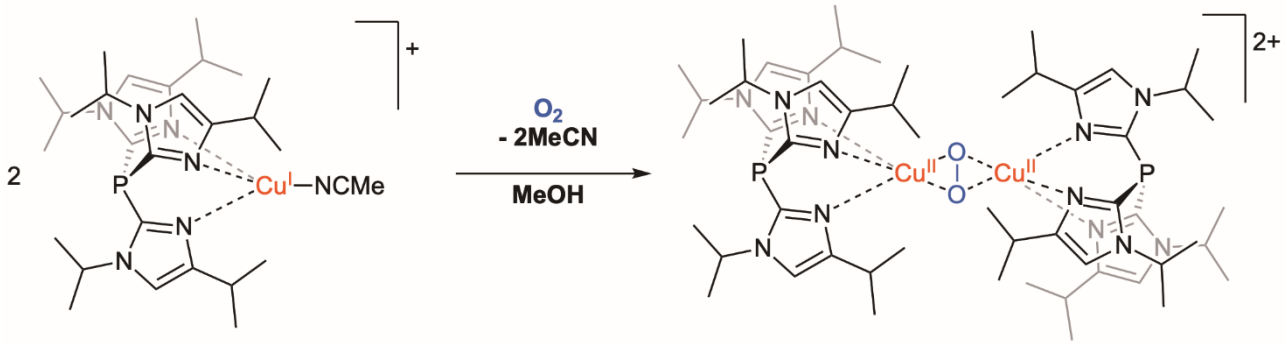
From complex to simple: reactivity of copper complexes towards dioxygen and ozone

Siegfried Schindler* (SS)
Chemistry Department, Justus-Liebig-University, Heinrich-Buff-Ring 17, 35392 Gießen, Germany
siegfried.schindler@anorg.chemie.uni-giessen.de

Dioxygen activation is important in biochemistry, however, also quite interesting for the development of selective oxygenation reactions in the lab and chemical industry. Copper complexes in general are especially useful for these studies. The oxygen carrier hemocyanin has a dinuclear copper complex in its active site that forms a trans-μ-peroxido complex when reacted with dioxygen. The reaction can be modeled with a copper complex with a tris(imidazolyl)phosphine ligand according to the following scheme:[1]



Scheme. A model system for the reversible dioxygen uptake of the oxygen carrier protein hemocyanin.

While a superoxido complex must form in a first step, this could not be observed spectroscopically. This could be explained by a formal kinetic treatment and for other related system it had been supported by DFT calculations.[2] Recently we observed that superoxido copper complexes can also be obtained through a reaction with ozone. [3] The different mechanisms will be discussed.

References

[1] M. Lerch and S. Schindler, *Eur. J. Inorg. Chem.* **2020**.

[2] A. Hoffmann, M. Wern, T. Hoppe, M. Witte, R. Haase, P. Liebhäuser, J. Glatthaar, S. Herres-Pawlis and S. Schindler, *Eur. J. Inorg. Chem.* **2016**, 4744-4751.

[3] T. Rotarmel, J. Becker and S. Schindler, *Faraday Discuss.* **2022**, *234*, 70-85.

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