

EXPLORING IRON IN CHEMISTRY AND BIOLOGY WITH THE MÖSSBAUER EFFECT

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Mössbauer spectroscopy and synchrotron based nuclear resonance scattering are ideal tools to investigate electronic and dynamic properties of iron centers in chemical and biological systems [1,2]. These methods have reached a level of sophistication during the last decades so that it is now possible to hunt for particular functional active iron sites even in very complex systems like iron based heterogeneous catalysts or even in some cases in biological cells. This tutorial will try to give a comprehensive overview of what can be achieved nowadays by using experimental techniques using the Mössbauer effect when combining different evaluation strategies like e.g. relatively straight forward analysis using lorentzian lines and more sophisticated investigations of paramagnetic iron sites by means of the spin Hamiltonian formalism [3,4]. The lecture will start with some general aspects on sample requirements continuing with selected examples regarding the determination of spin states and oxidation numbers of iron centers both in chemical and biological systems. In addition, some examples of chemical and biological applications of synchrotron techniques based on the Mössbauer effect like nuclear forward and nuclear inelastic scattering will be given.

References

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