

P025 Free radicals in haem proteins: electron transfer pathways caused by structure

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Haem proteins are free radical factories. Natural reactivity of the ferric haem with peroxides causes formation of protein bound free radicals in many enzymatic reactions. In the respiratory haem proteins, the reactivity contributes significantly to the overall mechanism of oxidative stress. The free radical formation shows extreme diversity in different proteins, being structure dependent. The yield of the observable free radicals is typically low. This fact prevents from effective studying such radicals by a number of modern advanced EPR methods, such as pulsed methods, ENDOR and high field EPR and their numerous combinations. The traditional CW X-band EPR remains the main method for obtaining data on the radicals formed on proteins and enzymes during naturally occurring reactions. Recent advances in this field will be reported. This includes detection of multiple radicals in the systems, deconvolution of complex EPR spectrum into the signals from individual radicals, quantitatively accurate determination of the concentration of each radical at various reaction times, assignment of the individual free radical EPR signals to specific radical types and specific locations in the protein. It will be shown that this information, when accurately documented, is sufficient for constructing and testing the kinetic models of the electron transfer processes in proteins and enzymes.