Oxidative Degradation of Porphyrins and Metalloporphyrins under Polythermal Conditions

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Abstract—Influence of structure on the thermal properties of a large group of natural and synthetic porphyrins (H_2P) and metalloporphyrins (MP) was analyzed on the ground of thermogravimetric studies. The initial stage of thermal degradation of "classical" porphyrin containing a flat or pseudo-planar macrocycle is a result of oxidative degradation of the macrocyclic structure with the formation of linear tetrapyrrols. The negative effect on the thermal stability of porphyrins exerts the violation of the planar structure of the macrocycle, and the presence of bulky alkyl and polar pseudoalkyl substituents. In many cases, the general trend in the decrease in the stability of metalloporphyrins (MP) in comparison with the corresponding H_2P is a consequence of intramolecular metal ↔ ligand redox processes.

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