Interference by Nickel(II) Salts and Their 5-Methylimidazole-4-carboxylate Coordination Compounds on the Chloroplast Redox Chain

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Nickel(II) salts and their coordination compounds with ethyl 5-methylimidazole-4-carboxylate (emizco), [Ni(emizco)2Cl2], [Ni(emizco)2Br2], [Ni(emizco)2(H2O)2](NO3)2·H2O, Ni(NO3)2, inhibit photosynthetic electron flow (basal, phosphorylating and uncoupled) and ATP-synthesis, therefore behave as Hill reaction inhibitors. Coordination compounds are more potent inhibitors than the salts. It was found that the target for NiCl2, NiBr2 and Ni(NO3)2 is at the b6f level. On the other hand, the complexes [Ni(Emizco)2Cl2], [Ni(Emizco)2Br2] and [Ni(Emizco)2(H2O)2](NO3)2·H2O binding sites are located at Qb(D1)-protein and b6f level. Therefore, they have a common inhibition site located at b6f avoiding the PQH2 oxidation. The Qb inhibition site was corroborated by variable chlorophyll a fluorescence yield [V(j)]. The emizco ligand has no activity on photosynthetic electron flow.

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