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Sensitivity of the alkylsulfid-terminated difunctionalized Iron(II) clathrochelate to a conformation of transport protein albumin

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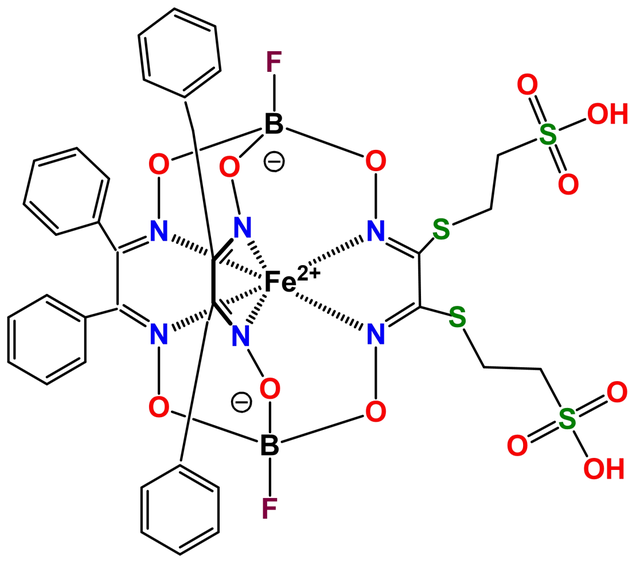

Fig. 1. Structure of the alkylsulfid-terminated diribbed-difunctionalized iron(II) clathrochelate.

Iron(II) clathrochelates, which are the three-dimensional cage complexes containing an encapsulated Fe^{2+} ion, were shown to acquire an intensive circular dichroism signal – induced CD (ICD) spectra – upon binding to some proteins, particularly albumins [1-3]. Changes in the shapes and in the intensities of these spectra reflect both the conformation transitions of proteins macromolecules and their structural alterations.

Current task

To examine the interaction of the alkylsulfid-terminated diribbed-difunctionalized iron(II) clathrochelate (Fig. 1) with serum bovine albumin (BSA) at pH 7.9 and pH 4.3, and clathrochelate-to-BSA concentration ratios 1:2 and 2:1 by induced circular dichroism (ICD) method.

Results

We studied ICD response of iron(II) clathrochelate (Fig. 1) on the presence of BSA at pH 7.9 (1, 2 at Fig. 2) and pH 4.3 (3, 4 at Fig. 2), and clathrochelate-to-BSA concentration ratios 1:2 (1, 3 at Fig. 2) and 2:1 (2, 4 at Fig. 2).

While for pH 7.9 clathroshelate ICD spectra were similar for both protein concentrations and contained two positive (near 350 and 530 nm) and one negative (near 450 nm) maxima, in the case of pH 4.3 lower protein concentration leads to drastic changes in ICD spectrum, namely the mirror reflection of the bands.

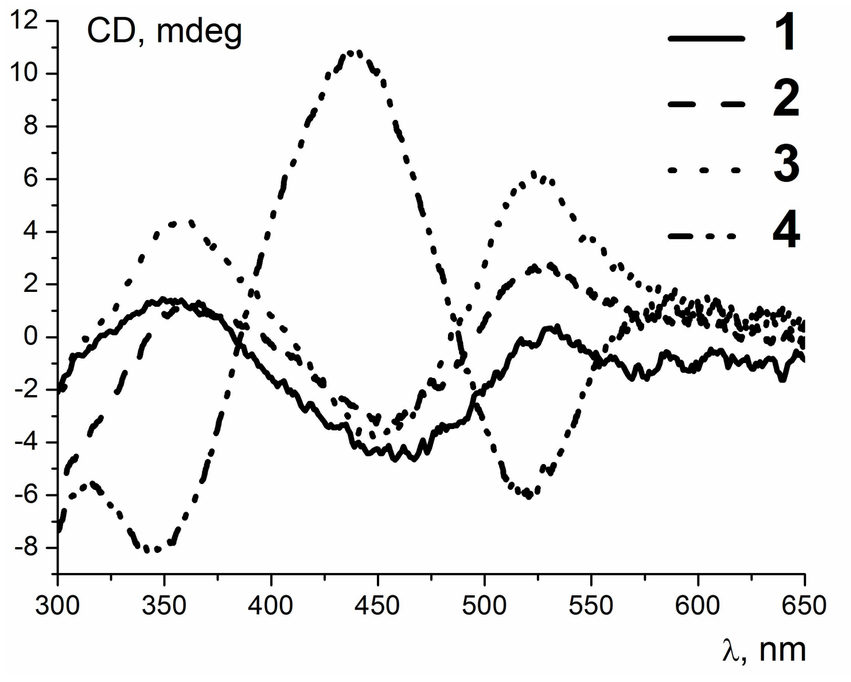

Fig.2. ICD spectra of the BSA – clathrochelate assemblies.

Conclusions

1. Thus, iron(II) clathrochelate was found to give a pronounced CD output upon its binding to globular protein BSA.
2. It was found that pH change from 7.9 to 4.3 at the clathrochelate-to-BSA concentration ratio 2:1 strongly affects the clathrochelate ICD spectrum. We believe that partial conformation transition of BSA macromolecule leads to appearing of additional sites on BSA macromolecule for clathrochelates binding at higher clathrochelate-to-BSA concentrations ratio.
3. So, the cage iron(II) complexes of this type are prospective for the design of the protein sensitive ICD reporters.

References

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