X-ray Examination of the Complex Adenosine, Guanosine and Cytidine with UO_2^{2+} Ions

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Abstract: Interaction of dioxouranium (VI) UO_2^{2+} ion with Adenosine-5'-triphosphate, Guanosine-5'-triphosphate and Cytidine-5'-triphosphate were obtained a complex of Adenosine, Guanosine and Cytidine with uranium UO_2^{2+} ions and X-ray method to explore these complexes.

Key words: DNA, uranyl ion, X-ray, Adenosine, Guanosine, Cytidine complexes.

1. Introduction

Metal complex formation of nucleotides is well documented, as well as its biological importance. Metal-nucleotide complex may act as cofactor, substrate or modifier in promoting enzymatic catalysis of displacement reactions of phosphorus and maintaining structural integrity and specificity of nucleic acids. Nucleotides bind metal through three potential binding sites: phosphate groups, sugar hydroxyl groups and ring nitrogen of base [1-13].

The purpose of this work is to obtain a complex of adenosine with uranium UO_2^{2+} and thorium Th^{4+} ions and X-ray method to explore these complexes.

2. Experimental Sections

Dioxouranium (VI) (UO_2^{2+}) and thorium (Th^{4+}) cations were used as nitrate salts. ATP (5'-adenosine 5'-triphosphate), ADP (5'-adenosine 5'-diphosphate), AMP (5'-adenosine 5'-monophosphate), CTP (5'-cytidine triphosphate), CDP (5'-cytidine diphosphate), CMP (5'-cytidine monophosphate), GDP (5'-guanosine diphosphate), was used as disodium salt.

3. Results and Discussion

In Ref. [1] has been studied interaction of dioxouranium (VI) (uranyl) ion with ATP was studied by ligand/proton and metal/hydroxide displacement technique, at very low ionic strength and at $I = 0.15 \text{ mol}\cdot\text{L}^{-1}$, in aqueous Me_4NCl and NaCl solutions, at $t = 25^\circ\text{C}$.

The interaction of adenosine with uranyl ions is described by the Eq. (1):

Analysis of the complex of adenosine with uranium UO_2^{2+} and thorium Th^{4+} ions was performed by X-ray microanalysis. Instrument: electron probe microanalyzer. Brand: Superprobe 733, Japan Electron Optics Laboratories, Japan.

The analysis of the elemental composition of the resulting of the microsphere magnetic catalyst with salts of Thorium and of Uranium was performed using energy-dispersive spectrometer Energy Oxford Instruments, England, established by electron probe microanalyzer Superprobe 733 at an accelerating voltage of 25 kV and a probe current of 25 nA.

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Fig. 1 Obtained a complex of A, G, C with UO_2^{2+} .

Fig. 2 X-ray spectrum of the complex Adenosine-5'-triphosphate, with UO_2^{2+} .

Figs. 1 and 2 show the laboratory unit and X-ray spectrum of the complex Adenosine with UO_2^{2+} and Th^{4+} .

Table 1 shows the elemental composition of the complex Adenosine with uranium (UO_2^{2+}) and thorium (Th^{4+}) ions.

Thus, the authors obtained a complex of adenosine with uranium UO_2^{2+} and thorium Th^{4+} ions and X-ray method to explore these complexes.

Fig. 3 shows the IR (infrared spectroscopy) spectra of the complexes Adenosine, Guanosine and Cytidine with UO_2^{2+} ions.

Table 1 Elemental composition of the complex Adenosine with UO_2^{2+} and Th^{4+} ions.

Element	P	Na	Th	U
Unit %	3.556	9.055	0.100	84.421

(a)

(b)

(c)

(d)

(e)

(f)

Fig. 3 IR spectrum of the complex ATP (a), ADP (b), AMP (c), CTP (d), CDP (e), CMP (f), CDP (g) with UO_2^{2+} .

Thus, the authors obtained a complex of ATP, ADP, AMP, CTP, CDP, CMP, GDP with uranium UO_2^{2+} ions and IR spectra and X-ray method to explore these complexes.

4. Conclusions

Interaction of dioxouranium (VI) UO_2^{2+} ions with ATP, ADP, AMP, CTP, CDP, CMP, GDP was obtained a complex of adenosine with uranium UO_2^{2+} ions and X-ray method to explore these complexes.

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