likely that all these compounds have closely related structures.

A tetrahydrate $LnM(ReO_4)_4 \cdot 4H_2O$ (Ln ≅ Eu–Lu and M = Na, K, Rb, Ag) is disclosed for the $LnM(ReO_4)_4$ compounds. They are all isotypic and their structure (tetragonal $P\bar{4}n2$) is described for $GdNa(ReO_4)_4 \cdot 4H_2O$.

The lanthanide contraction is well observed for each series and in some cases the tetrad effect is also observed.

A large number of related compounds, for example simple perrhenates as $Ln(ReO_4)_3$ and $Am(ReO_4)_3$ or complex perrhenates as $Ln(MoO_4)(ReO_4)$ are structurally linked up with these series, so they are mentioned with their relationships by isomorphous substitution.

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Coordination Compounds of Lanthanides with Acetylhydrazine

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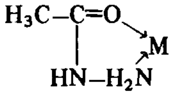
Coordination compounds $M(AH)_nX_3 \cdot mH_2O$, M = Pr, Nd, Eu, Gd, Dy, Ho, Er, Tm, Lu; X = Cl, NO_3, n = 3, 4, 5; X = NCS, n = 3; m = 0, 1, 3; AH=CH_3-$CONHNH_2$ were isolated from water or ethanol solutions by reactions of lanthanide salts with acetylhydrazine. On the basis of IR and Raman spectra investigations of the normal and deuterated complexes it was shown that all these compounds contain chelate metal-hydrazide rings.



(M = Pr, Nd, Eu, Gd, Dy, Ho, Er, Tm, Lu).

The crystal structure of compounds $[Dy(AH)_3(H_2O)_3]Cl_3$ (I), $[Ho(AH)_3(H_2O)_3]Cl_3$ (II), $[Er(AH)_4(H_2O)](NO_3)_3$ (III), $[Pr(AH)_5](NO_3)_3$ (IV) were determined.

The coordination numbers were found 9 in I–III and 10 in IV. The polyhedron of metals has the configuration of threecapped trigonal prism in I and II, the configuration of monocapped square antiprism in III and configuration of twocapped square antiprism in IV.

The metal–ligand bond lengths (mid.) in complexes are: Ln–N: 2.571(1), 2.542 (III), 2.760 Å (IV); Ln–N(AH): 2.360 (I), 2.337 (III), 2.497 Å (IV); Ln–O(H_2O): 2.425 (I), 2.363 Å (III).

H-bonds type O–H···O(Cl) and N–H···O(Cl) in complexes observed.

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Complex Formation Between Trivalent Actinides and Pyrocatechol

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A continuous research work was done for the development of powerful chelating agents specific for trivalent and tetravalent actinide ions. In the recent years intensive investigations were carried out using some catecholate chelating ligands connected with the strong complexing power of the catecholate group [1–3]. The catecholate ligand is essential for the metabolism in biological systems especially some substituted catechol derivatives. They can be used as specific sequestering agents for removal of actinides from biological systems [4], which is important for environmental research and nuclear medicine as well.

It was found also that some substituted pyrocatechols act as effective extractants for both tracer and macroquantities of transplutonium elements as well as rare earths from strong alkaline solutions [5]. While most of the research was performed studying tetravalent actinides, little is known about the complexation between pyrocatechol and actinides in the trivalent state.

Thus, we have chosen to investigate the catecholate reactions with trivalent actinides by the means of the solvent extraction method.

We found out that hydrolysis and sorption of Am^{3+} prevail from pH higher than 6 and because pyrocatecholate ligand is not stable in the alkaline region the experiments have to be performed in argon atmosphere. The complex formation between americium and pyrocatechol is obviously stronger than both sorption and hydrolysis at pH higher than 9. There is also experimental evidence that the ligand itself is extracted by the TBP agent which further complicates the system.

The mechanism of complex formation and the stability of the complexes formed will be investigated in detail to serve as a base for comparison with the complexation of some biologically active catechols.

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Stabilization of Novel Organouranium Compounds by the Bulky 1,3-Bis(trimethylsilyl)cyclopentadienyl Ligand

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The development and utilization of the 1,3-bis(trimethylsilyl)cyclopentadienyl ligand (referred to as Cp″) by Professor M. F. Lappert has resulted in the preparation, isolation and X-ray characterization of several novel organolanthanide and -actinide compounds. This presentation will report the results of our X-ray structural studies of the following organouranium compounds: Cp''_2UCl_2 (I), $Cp''_2U(BH_4)_2$ (II), and $Cp''_2U(OAr)_2$ (III) where OAr = 2,5-dimethylphenoxide.

Compound (I) crystallizes in the monoclinic space group C2/c with unit cell parameters a = 27.037(9), b = 7.084(3), c = 22.327(9) Å, and β = 131.83(4)°. Final agreement factors of R = 0.020 and R_w = 0.026 were obtained for 1701 observed reflections. The uranium atom resides on a crystallographic two-fold axis. The only unique U–Cl bond length is 2.579(2) Å. The average U–C distance is 2.72(1) Å.

Compound (II) crystallizes in the monoclinic space group C2/c with unit cell parameters a = 27.731(9), b = 7.138(4), c = 22.561(9) Å, and β = 132.45(5)°. The final R factor was 0.026 for 1199 observed reflections. (II) is isostructural with (I). The BH_4^- is coordinated to the uranium atom in a tridentate fashion. The U–H bond lengths are in the range of 2.37–2.42 Å.

Compound (III) crystallizes in the triclinic space group $P\bar{1}$ with unit cell parameters a = 10.236(5), b = 10.830(6), c = 19.767(7) Å, α = 90.25(4), β = 92.20(4), and γ = 103.09(6)°. The final agreement factor was 0.039 for 4518 observed reflections. The U–O bond distances are 2.12(6) and 2.109(6) Å.

A detailed discussion of the crystal and molecular structure of the above compounds will be presented and comparisons made with other organoactinide compounds already in the literature.