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Centre d'Etude Nucleaires de Saclay, France and Institute »Ruđer Bošković« Zagreb

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Total Reaction Cross Sections of Proton Induced Reactions

J. Olkowsky, P. Strohal, and N. Cindro

Centre d'Etude Nucleaires de Saclay, France and Institute »Ruđer Bošković« Zagreb

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Magister of Science Thesis

Croat. Chem. Acta **35** (1963)

Precipitation and Hydrolysis of Thorium(IV) in Aqueous Solution: Thorium Nitrate — Potassium Hydroxide

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The precipitation and hydrolysis of thorium(IV) in aqueous solutions of thorium nitrate — potassium hydroxide was investigated at 20° C by a tyndallometer and pH-meter. A three-dimensional precipitation diagram for a wide range of concentrations of both precipitating components was constructed.

The effect of carbonate ions present on the precipitation of thorium hydroxide was estimated. From the solubility curve of thorium hydroxide, the solubility and hydrolytic constants were determined by a simple graphical method:

$$\log \bar{K}_{S0} = -45.7; \quad \log \bar{K}_{S2} = -24.3; \quad \beta_2 = 1.029 \times 10^{-7}$$

The solubility products obtained are valid in a very narrow concentration range.

From the slope of the tangents on the solubility curve the predominant soluble hydrolytic species in equilibrium with the solid phase are directly evident: free ion Th^{4+} for $pH < 3.4$ and $[Th(OH)_2^{2+}]_n$ for $3.4 < pH < 4.1$.

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Examiners: Professor B. Težak, Dr Z. Pučar, Doc. R. Wolf.
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H. BILINSKI

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1. Precipitation and Hydrolysis of Thorium(IV) in Aqueous Solution: Thorium Nitrate-Potassium Hydroxide

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Constants, cumulative hydrolytic
Hydrolysis
Precipitation
Solubility
Thorium hydroxide
Tyndallometric measurements

MCC-2 539.172.4

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Isomeric Cross Section Ratios for Some 14.6 MeV Neutron Induced Reactions

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Isomeric cross section ratios have been measured for 4 typical neutron induced nuclear reactions, at 14.6 MeV bombarding energies. The following reactions have been investigated: $^{69}Ga(n,p)^{69}Zn$, $^{133}Cs(n,p)^{133}Xe$, $^{72}Ge(n,\alpha)^{69}Zn$ and $^{192}Os(n,2n)^{191}Os$. The isomer pairs were chemically separated and counted using a 256-channel analyser and beta counter. The experimental values were compared with those calculated by the method of Huizenga and Vandenbosch, based on the statistical model theory. The agreement between theory and experiment for (n, charged particle) — reactions in the above three cases is surprisingly good. The best fits were obtained with values of inertia parameters σ close to one half of the rigid body values. Also, low values of parameter ν (number of gamma deexcitations) show in general a better agreement with the experimental values. The reaction leading to neutrons yielded a very small isomeric ratio. The agreement of the theoretical and experimental values is quite poor, and in the present case the theory gives correctly only the order of magnitude of the experimental isomeric ratio. A general inference is that the compound nucleus theory in its simplest form can qualitatively account for the calculations of isomeric ratios of neutron-induced reactions without unreasonably stretching the range of parameters.

Examiners: Professor M. Mirnik, Dr. P. Strohal, Professor N. Cindro.

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1. Isomeric Cross Section Rations for Some 14.6 MeV Neutron Induced Reactions

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Isomeric Ratios
14.6 MeV Neutrons
^{69}Ga (n, p) ^{69}Zn
^{133}Cs (n, p) ^{133}Xe
^{72}Ge (n, α) ^{69}Zn
^{192}Os (n, 2n) ^{191}Os
Statistical model