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两种新稀土双核配合物的合成、表征及其对磷酸二酯键模型物（**BDNPP**）和**DNA**的作用研究

杨频,周春琼

山西大学分子科学研究所

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摘要 合成和表征了两种新的双核配合物[Eu_2 (bbimp) (CH_3COO) (CH_3CH_2O)_2 (CH_3CH_2OH)] (ClO_4)_2 (A)和[Nd_2 (bbimp)-(CH_3COO) (CH_3CH_2O)_2 (CH_3CH_2OH)] (ClO_4)_2 (B)。用紫外光谱法分别研究了磷酸二酯键模型物双-（ 2，4-二硝基苯基）磷酸盐（BDNPP）与配合物（A，B）的水解动力学反应。当 BDNPP与A，B的浓度均为2.5 * 10~(-5) mol/L时，反应为二级反应；在25 ℃，pH 7.26时，二级水解速率常数分别为2479 (mol/L)~(-1)·min~(-1)，1678 (mol/L) ~(-1)·min~(-1)，半衰期分别为16.1 min和23.8 min，比单独的Eu~(3+)，Nd~ (3+)水解BDNPP的速率均快得多，37 ℃时反应更快；在25 ℃，pH 6.50～8.50时， 两个反应的水解速率常数的lgK与pH值均呈正的线性关系。两种配合物与小牛胸腺 （CT） DNA作用，使CT DNA最大吸收峰发生减色和红移，使溴化乙锭（EB）-DNA复合物体系荧光强度减弱。两种配合物对超螺旋质粒pBR322 DNA的断裂在50 ℃，pH 8.0时，效果最好。

关键词 稀土金属络合物 双核络合物 磷酸酯 水解 脱氧核糖核酸 紫外分光光度法 反应动力学 铕络合物 钕络合物

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Synthesis and Characterization of Two New Rare-earth Complexes and Their Research for Cleaving an Activated Phosphate Diester BDNPP and DNA

Yang Pin,Zhou Chunqiong

Institute of Molecular Science, Shanxi University

Abstract [Eu_2(bbimp) (CH_3COO) (CH_3CH_2O)_2(CH_3CH_2OH)] (C1O_4)_2(A) and [Nd_2(bbimp) (CH_3COO)-(CH_3CH_2O)_2(CH_3CH_2OH)](C1O_4)_2(B) were synthesized and characterized. The kinetic studies on the hydrolysis of BDNPP by complexes were carried out by UV-vis methods. The two reactions obey the second-order when the complexes (2.5 * 10~(-5) mol/L) cleaved BDNPP (2.5 * 10~(-5) mol/L) . The rate constants and the half-time at 25 X. and pH 7.26 for the hydrolysis of BDNPP are 2479 (mol/L) ~(-1) · min~(-1), 16.1 min in A , and 1678 (mol/L) ~(- 1) · min~(-1), 23 .8 min in B. They are more reactive than that Eu~(3+) and Nd~(3+) for cleaving BDNPP. Furthermore, A or B is more reactive at 37 ℃ than at 25 ℃ for cleaving BDNPP. The pH-lgK for the two hydrolytic reactions were approximated with a linear equation at 25 ℃ in the pH 6.50 ～ 8.50. The investigation on the interaction of both complexes and CT DNA indicates that the absorbance value and the wavelength number at the maximum peak of GT DNA are reduced and red- shifted while the intensity of fluorescene spectra of EB-DNA is gradually weaken. The two complexes are capable of promoting cleavage of pBR322 DNA at 50℃ and pH 8.0.

Key words RARE EARTH METAL COMPLEX DINUCLEAR COMPLEX PHOSPHATES HYDROLYSIS DNA UV REACTION KINETICS EUROPIUM COMPLEX NEODYMIUM COMPLEX

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