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稀土(III)-冠醚配位反应的热力学性质I:稀土(III)高氯酸盐与苯-15-冠-5-在乙腈溶液中配位反应的量热滴定研究

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摘要 用量热滴定法于298.15K测定了除钪、钷以外的全部十五种稀土(III)高氯酸盐与苯并-15-冠-5在乙腈溶液中的配位作用。借助计算机算出了配合物的稳定常数和配位焓,进而算出了配位自由能和配位熵。结果表明:十五种稀土(III)离子与苯并-15-冠-5都可以配位,配位焓为正值;La^3^+配合物最稳定, Ce^3^+次之, 其余稀土(III)离子配合物稳定性变小, 但彼此差别不大,在Tb处有突变;熵在配合物形成时起稳定化作用。

关键词 计算机应用 稳定常数 冠式化合物 苯 P 热力学函数 稀土金属络合物 熵 焓 高氯酸盐 乙腈 配位反应 量热滴定

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Studies on thermodynamics of rare earth (III)-crown coordination compounds I:Calorimetric titration for coordination reaction of rare earth perchlorates with benzo-15-crown-5 in acetonitrile

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Abstract The coordination reactions of benzo-15-crown-5 with fifteen rare earth (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y) perchlorates in acetonitrile were studied at 298.15 K by calorimetric titration The stability constants of coordination compounds and enthalpies of coordination reaction were calculated The values of free energy and entropy of coordination reactions were also obtained. The rare earth ions (III) can coordinate with benzo-15-crown-5 and all the enthalpy changes are endothermic. The coordination compound of La3+ is the most stable, followed by the Ce3+ compound The other compounds do not show distinct differences in stability; a sudden change was observed at Tb. These coordination compounds are stabilized by entropic effects.

Key words COMPUTER APPLICATIONS STABILITY CONSTANT CROWN ETHER COMPOUNDS BENZENE P THERMODYNAMIC FUNCTION RARE EARTH METAL COMPLEX ENTROPY ENTHALPY PERCHLORATE ACETONITRILE COORDINATION REACTION CALORIMETRIC TITRATION

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