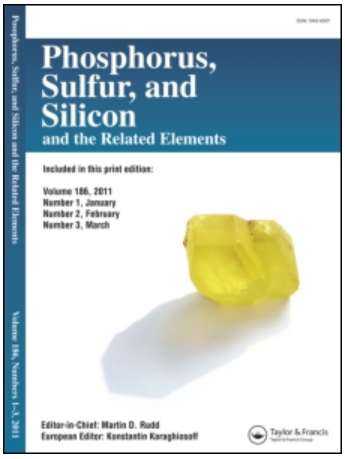

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Similarity and Dissimilarity between Mg 2+ -Mediated and NH 4 + -Mediated Reactions Catalyzed by Hammerhead Ribozyme

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SIMILARITY AND DISSIMILARITY BETWEEN Mg^{2+}-MEDIATED AND NH_4^+-MEDIATED REACTIONS CATALYZED BY HAMMERHEAD RIBOZYME

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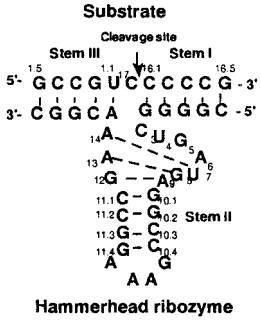
In hammerhead ribozyme reactions, it was reported that a hammerhead ribozyme reaction proceeds in the presence of high concentrated NH_4^+ ions. We performed an experiment on a solvent isotope effect of the ammonia-mediated hammerhead ribozyme reaction, resulting in the intrinsic isotope effect to be ~2 (apparent isotope effect: ~7.7; Figure 1). This result indicates the existence of transfer of a proton in the transition state of the ammonia-mediated ribozyme reaction. We previously reported that a Mg^{2+} ion might act as a Lewis acid catalyst at the leaving 5′-oxygen in the transition state of a hammerhead ribozyme reaction on the basis of the experiment of the solvent isotope effect.[1] Thus, it strongly suggests the different catalysts between the magnesium-mediated hammerhead ribozyme reaction and the ammonia-mediated.



	1st	2nd	3rd	4th	5th	average
$\frac{k_{obs}H_2O}{k_{obs}D_2O}$	7.54	7.20	7.46	8.72	7.50	7.68

FIGURE 1

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It is likely that a Mg^{2+} ion works as a Lewis acid catalyst in the transition state and a NH_4^+ ion does as a general acid, in each reaction.

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[1] S. Sawata, M. Komiyama, and K. Taira, *J. Am. Chem. Soc.*, **117,** 2357–2358 (1995).