

The Hydrolysis of Phosphate Esters Can Be Enhanced by Intramolecular Hydrogen Bonding

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Abstract : The research project aim is to study the hydrolysis of 8-diethylphosphate-1-naphthalenol with hydroxylamine in water. 8-diethylphosphate-1-naphthalenol, 1 was successfully synthesized and its rate of reaction with hydroxylamine was studied at 60°C. Pseudo first order behavior was observed. The rate of P-O cleavage of 1 at 60°C ($7.43 \times 10^{-3} \text{ M}^{-1}\text{s}^{-1}$) was found to be 178 fold and 7 fold slower than diethyl 8-dimethylamino-1-naphthyl phosphate, 3 at 60°C ($1.32 \text{ M}^{-1}\text{s}^{-1}$) and diethyl 8-amino-1-naphthyl phosphate, 2 at 90 °C ($5.5 \times 10^{-2} \text{ M}^{-1}\text{s}^{-1}$) respectively. The rate of P-O cleavage of 1 with hydroxylamine was found to be faster than that of 4-chlorophenyl-1-cyclopropylphosphate triester, 5 where the reaction was too slow to observe at 60°C.

Keywords : phosphate esters, intramolecular hydrogen bonding

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