

## Séminaire :

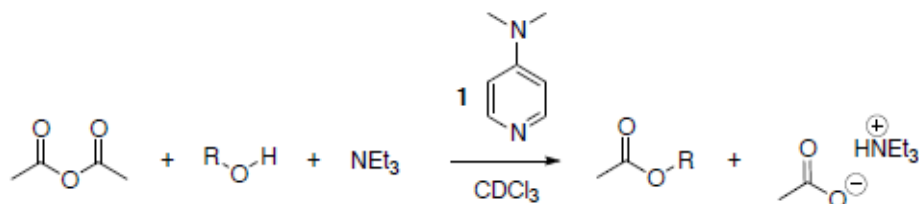
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**"Quantitative aspects of nucleophilic organocatalysis.  
A theoretical perspective."**

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(résumé complet et bibliographie au dos)

Lewis-bases such as *N,N*-dimethylaminopyridine (**1**) play an important role in organocatalysis.<sup>1</sup> In group-transfer reactions such as the esterification of alcohols with acetic anhydride the reactions are often performed in apolar solvents in the presence of an auxiliary base such as  $\text{NEt}_3$ . The reactions are assumed to involve initial reaction of the catalytic base **1** with the anhydride reagent, leading to the formation of acylated catalyst **1**. Reaction of this intermediate with the substrate alcohol in the (presumably) rate limiting step then generates the ester product together with one equivalent acetic acid. Neutralization of the latter involves one equivalent of auxiliary base  $\text{NEt}_3$  and avoids protonation (and thus deactivation) of the catalytic base.<sup>2</sup>



Attempting to verify this mechanism and develop new catalyst of enhanced activity, we have used a number of different theoretical approaches for the quantitative prediction of the experimentally observed catalytic activity. The theoretical models tested include: (a) partial charge parameters of the Lewis base catalysts such as that of the pyridine nitrogen atom; (b) affinity numbers such as the acetylation energies of Lewis base catalysts - this reflects in an indirect way the energetics of the initial acylation step;<sup>3</sup> (c) a restricted transition state model for the rate-limiting acyltransfer step; (d) a full transition state model for the acyltransfer step; (e) for selected catalysts the full potential energy surface of the catalytic cycle.

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