



Selective mono-Michael Addition: An Ionic Liquid Effect

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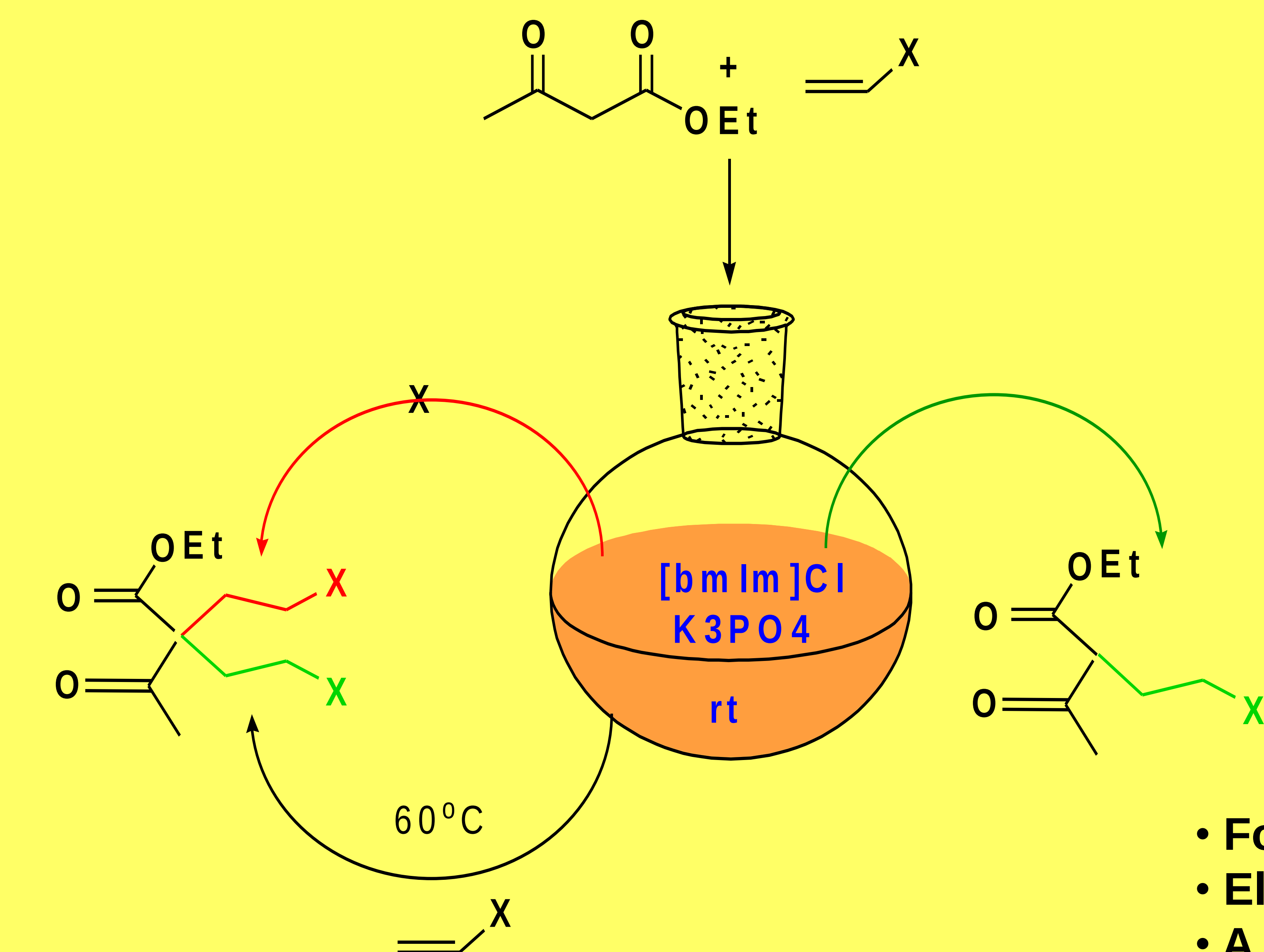
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Introduction:

The conjugate addition of nucleophilic species to α - β -unsaturated systems, commonly known as Michael addition is a fundamental concept in organic chemistry and is considered as one of the most versatile methods in organic synthesis.[1] Herein we report the exclusive *mono*-Michael addition of various active methylene compounds to conjugated esters and nitriles. Ionic liquid facilitated room temperature reaction is catalyzed by potassium phosphate

Results:



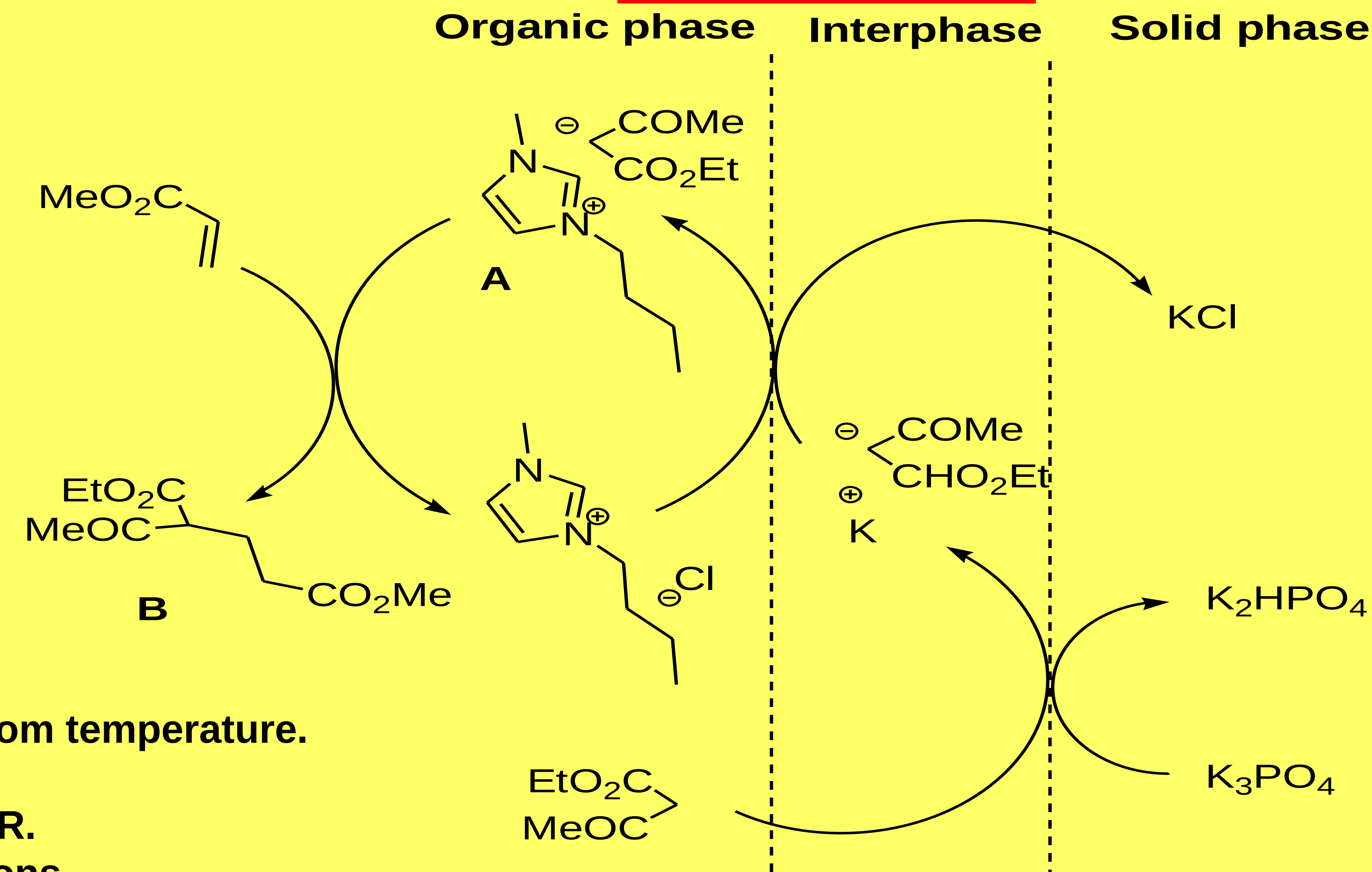
Key features:

- Use of nonvolatile ionic liquid solvent.
- Use of mild catalyst.
- Selective reaction.

Summary:

- Formation of exclusive mono-Michael addition product at room temperature.
- Elevated temperature results in double addition.
- A Mechanism proposed and supported by P³¹ and DOSY NMR.
- Protocol generalized with more than 15 substrate combinations.

Plausible Mechanism:



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Conclusion:

We have developed a potassium phosphate-ionic liquid catalyzed method for selective *mono*-Michael addition of active methylene compounds on acrylic esters and acrylonitriles. We have proposed a mechanism for the reaction based upon some earlier findings[3]. The mechanism is supported by P³¹ and DOSY NMR analysis of ionic liquid. The difficulty of existence of bulky ion pair of imidazolium cation [A] and anion of mono addition product [B] is a possible reason behind exclusive mono-addition.

Reference: 1) Jarvo, E. R.; Miller, S. J. *Tetrahedron* **2002**, 58, 2481. 2) B. C. Ranu, S. Banerjee, *Org. Lett.* 2005, **7**, 3049. 3) M. Makosza, M. Fedorynski, *Catal. Rev.* 2003, **45**, 321.