

Short communication

# On configuration correlations of 2-hydroxycarboxylic acids and their esters

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Received 24 July 2003; received in revised form 24 July 2003; accepted 17 October 2003

## Abstract

The aim of this paper is to clarify the confusion that exists in the literature with regard to the asymmetric hydrogenation of keto-carboxylic acids and their esters over Pt-cinchonidine catalysts. It has come to our attention that in many cases incorrect correlations between the absolute configuration and the sign of optical rotation of the product of the hydrogenation reaction—2-hydroxycarboxylic acid and their esters—are given in the literature. The correct correlation is (–)-rotating 2-hydroxycarboxylic acids and their esters have the *R*-configuration, and (+)-rotating have the *S*-configuration.

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**Keywords:** Asymmetric catalysis; Hydroxycarboxylic acids; Absolute configuration; Optical rotation

Recently much interest has been focused on the preparation of optically active 2-hydroxy-carboxylic acids and their esters via asymmetric hydrogenation of the corresponding 2-oxo-compounds over Pt-alumina catalysts modified by alkaloids such as cinchonidine as chiral additives. Enantioselectivities exceeding 90% have been achieved in some cases.

The use of cinchonidine as chiral modifier results in the selective formation of the 2-hydroxy product with the *R*-configuration. However, in many papers devoted to this process there is some confusion regarding the assignment of the absolute configuration to the optically active acid (or ester).

It is well known from monographs and textbooks [1–3] that lactic acid and lactate esters and mandelic acid and its esters with the (–)-optical rotation (sodium D-line) have the *S*-absolute configuration and the corresponding (+)-isomers have the *R*-configuration. Thus, *S*(+)-lactates correlated configurationally with *S*(+)-2-butanol and *SS*(–)-tartaric acid.

Similar correlations were established for *R*(–)-mandelic acid and its esters [1–3].

Careful examination of the literature reveals that some authors [4–7] give correct assignments while others [8–15] give incorrect correlations. We also note that the same authors sometimes give the correct correlation and sometimes the incorrect one. The aim of this communication is to clarify this confusion. Hence, we emphasize that (–)-rotating 2-hydroxycarboxylic acids and their esters have the *R*-configuration, and (+)-rotating the *S*-configuration.

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