CATALYSTS DERIVED FROM SUSTAINABLE NATURAL AND VALUE ADDED ALKALOIDS FROM POPPIES

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Alkaloids are a group of naturally occurring compounds that contain nitrogen heterocycles. Morphine and similar alkaloids are classified based on the ´morphinan´ skeleton. The morphine alkaloids (Fig. 1) are well studied in medicinal chemistry [1] but their use in asymmetric organocatalysis is a new research area. The rigid and well-defined morphine scaffold can be used as a source of chiral induction in asymmetric catalysis. A major advantage of morphine is that it is abundant, renewable and cheap raw material.

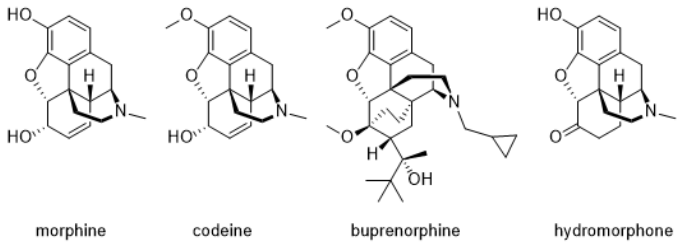

Figure 1 Morphine alkaloids

In this work, morphine alkaloids can be modified into quaternary ammonium salts, secondary amines, and chiral phosphoric acids (Fig. 2) which then can be used as phase transfer catalysts (PTC), aminocatalysts or Brønsted acid catalysts correspondingly. The initial studies show that only the quaternary ammonium salts of codeine show enantioselectivity.

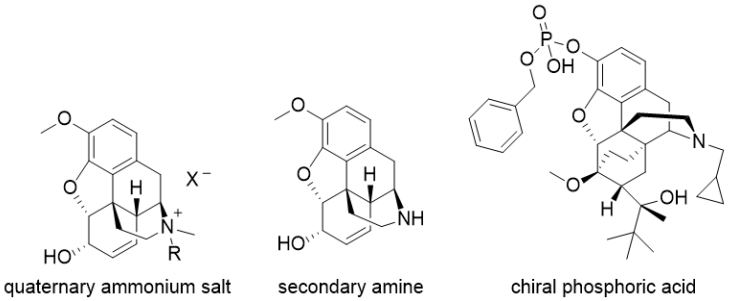

Figure 2 Modified morphine alkaloid structures

Opioid salts were tested in functional luciferase assay of opioid receptor signalling. Our data show that these are less potent activators of OR signalling than morphine.

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[1] Pathan, H.; Williams, J., British Journal of Pain, 2012, 6, 11-16.

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