Asymmetric Reduction of Ketones Using Aquatic Plant *Cabomba Caroliniana*

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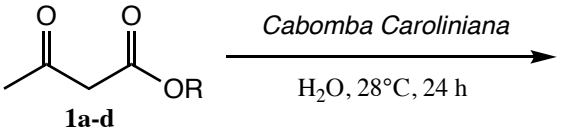
Optically active alcohols are important chiral starting materials for preparing pharmaceuticals and agrochemicals. Biotransformation can be used as an environmentally benign tool for obtaining optically active alcohols. We have been studying the asymmetric reduction of prochiral ketones using terrestrial plant cells as biocatalysts.[1] We have revealed that the yields and enantiomeric excess (ee) values of the reactions are closely related to photosynthetic activities of the cells. We focused on aquatic plant cells whose photosynthetic environments are different from those of terrestrial plant cells. *Cabomba caroliniana* is one of submerged perennial aquarium plants growing in freshwater. There are some papers on growth and photosynthetic metabolism of *C. caroliniana*.[2] We investigated the asymmetric ketone reduction using *C. caroliniana* as a biocatalyst.

Aquatic plant, *C. caroliniana*, (200 mg) was added to the solution (5 mL) of ketone (0.5 mmol) in H_2O. The reactions of *tert*-butyl 3-oxobutanoate (**1a**), pentan-3-yl 3-oxobutanoate (**1b**), isopropyl 3-oxobutanoate (**1c**), and ethyl 3-oxobutanoate (**1d**) using *C. caroliniana* as a whole cell biocatalyst were carried out at 28°C under illumination (fluorescent light, 1×10^2 μmol m^{-2} s^{-1}) for 24 hours.



1a-d **2a-d**

a: R = $C(CH_3)_3$
b: R = $CH(CH_2CH_3)_2$
c: R = $CH(CH_3)_2$
d: R = CH_2CH_3

	Conv. (%)	ee (%), *S*
a	67	92
b	100	>99
c	91	98
d	56	>99

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