Aiming at the industrial use of clay column chromatography for optical resolution

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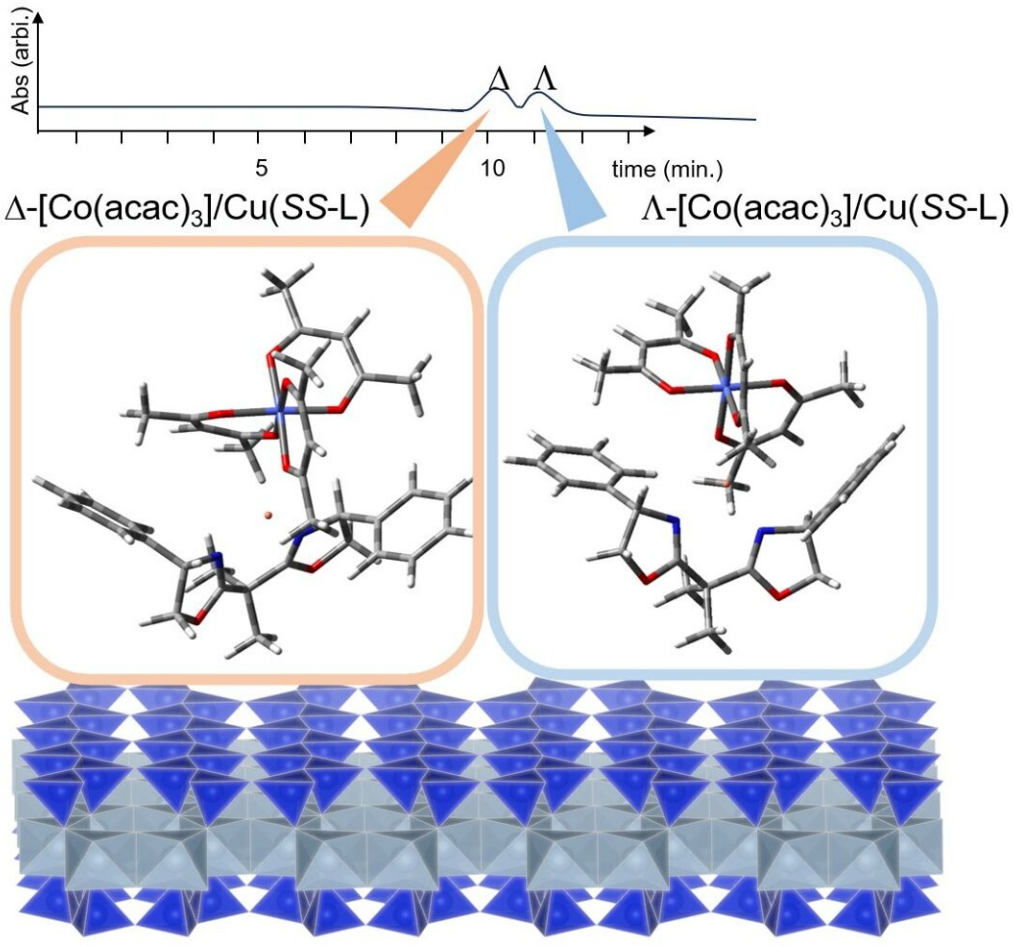

Chromatographic resolution of tris (acetylacetonato) cobalt(III) on a column packed with an ion-exchange adduct of synthetic hectorite and chiral Cu(II) complex, $[Cu(SS\text{-}L)]^{2+}$ (SS-L = SS-2,2′-isopropylidene-bis (4-phenyl-2-oxazoline)). Credit: Hisako Sato

A recent study, published in *Applied Clay Science*, could have applications in clay column chromatography for obtaining enantiomeric compounds in industries.

A spherically-shaped particle of synthetic hectorite (denoted as Na-HEC) was ion-exchanged with a divalent Cu(II) complex, $[Cu(SS\text{-}oxa)]^{2+}$ (SS-oxa = SS-2,2′-isopropylidene-bis(4-phenyl-2-oxazoline)). The material is denoted as $[Cu(SS\text{-}oxa)]^{2+}$/HEC.

A column for high performance liquid chromatography (HPLC) was prepared by packing 4.0 g of $[Cu(SS\text{-}oxa)]^{2+}$/HEC into a stainless tube (25 cm x 0.4 cm (i.d.)). When tris(acetylacetonato)cobalt(III) (denoted as $[Co(acac)_3]$) was eluted by methanol at the flow rate of 0.2 $mLmin^{-1}$at 4°C, the compound was separated to D- and L-enantiomers nearly to the baseline.

Useful organic molecules with two hydroxyl groups such as 1,1'-binaphthyl-2,2'-diol were also partially resolved.

With the help of theoretical simulation, it was concluded that the resolution was realized achieved by the occupation of the enantiomers in a cavity around a Cu(II) ion. The column also exhibited resolution ability

toward an organic molecule with two hydroxyl groups indicating that the molecule binds with a Cu(II) ion in a stereoselective way through coordinating interactions.

More information: Akihiko Yamagishi et al, Use of an ion-exchange adduct of synthetic hectorite and chiral copper(II) complex as a packing material for chromatographic resolution, *Applied Clay Science* (2024). DOI: 10.1016/j.clay.2024.107290

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