

Synthesis and chiral separation of bis (bipyridyl) manganese-tartrate complex

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[Introduction]

Even metal complexes with no asymmetric carbon can have chirality by limiting the coordination direction of ligands. In this study, *cis*-bis-bipyridylmanganese(II) chloride (1) was selectively prepared, then, chiral separation of (+)- and (-)-bis-bipyridylmanganese(II) tartrate complexes was accomplished through the reaction of (1) with (+)-disodium tartrate. Structural analysis of the obtained complex was carried out by *e.g.* powder X-ray diffraction measurement. Chiral separation of organic reagent using the synthesized complex is also tested.

[Experiments and results]

cis-[Mn(bpy)₂]Cl₂·H₂O: After mixing MeOH solutions of MnCl₂·H₂O and 2,2'-bpy in molar ratio of 1:2, the solvent was slowly evaporated by letting solution for several days. By recrystallizing the precipitates by H₂O/MeOH (1:1 v/v) mixed solvent, yellowish columnar crystals of *cis*-[Mn(bpy)₂]Cl₂(1) were obtained.(yield:43%)

(+)-[Mn(bpy)₂(tart)]: aqueous solutions of (1) and (+)-Na₂(tart)·H₂O were mixed in molar ratio of 1:2. Pale yellow needle-like crystals were filtered after standing for overnight. The presence of tartrate was confirmed by FT-IR spectrum, and the water molecule content was determined by TGA. The chemical formula should be (+)-[Mn(bpy)₂(tart)][Mn(tart)]·10H₂O(2). Powder X-ray diffraction study revealed that the space group of the crystal is *P n a 2*₁, with no inversion symmetry, in accordance with chiral material. Specific rotation measurement gave the value of +24.9, which means that this compound is (+)- enantiomer.

(-)-[Mn(bpy)₂(tart)]: To the filtrate, excess amount of 30 wt% NaI solution was added, then brownish-yellow crystals of (-)-[Mn(bpy)₂(tart)](3) appeared by cooling the solution down to 0°C. After filtration, the substance was washed by EtOH and dried in air. (yield:11%)

chiral separation of (+/-)-alanine: To the aqueous solution of (1), (+/-)-alanine solved in water was added. After night, pale yellow precipitate was obtained. Chemical analysis of this substance is in progress.

1) Y. Kobayashi,2021 Synthesis and structural analysis of Mn(II) complex with 2,2'-bipyridine(graduation thesis).

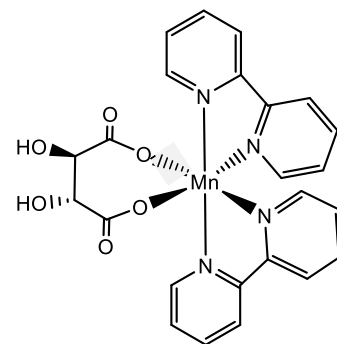


fig. chemical structure of (+)-[Mn(bpy)(+)-tart]