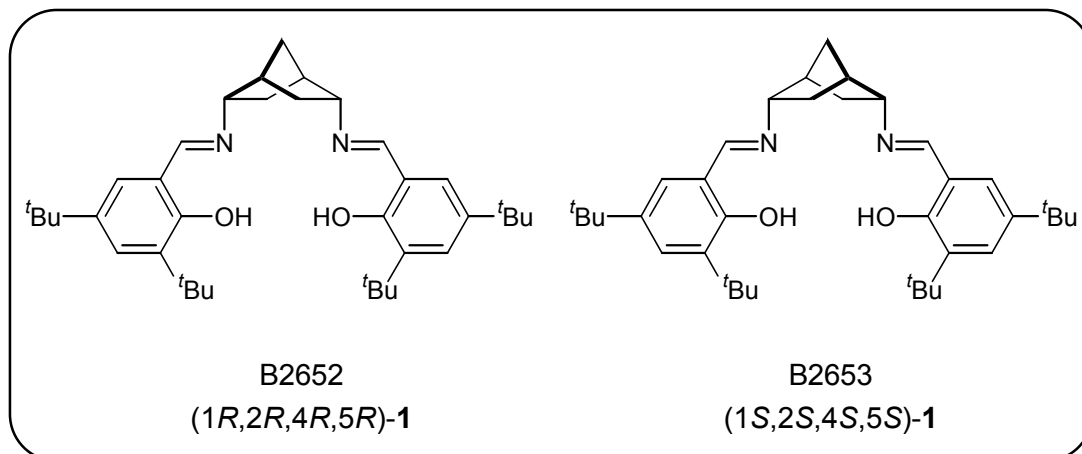
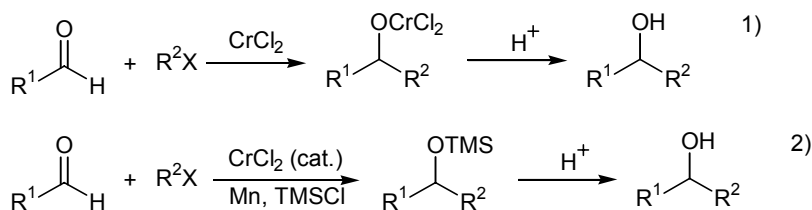


## DIANANE-Salen Ligand for Asymmetric Nozaki-Hiyama-Kishi Reaction



DIANANE-salen ligand **1** is a useful reagent for the asymmetric Nozaki-Hiyama-Kishi (NHK) Reaction as a ligand for transition metal complexes. Such complexes can be used as highly enantioselective catalysts to obtain chiral secondary alcohols in high enantiopurity.

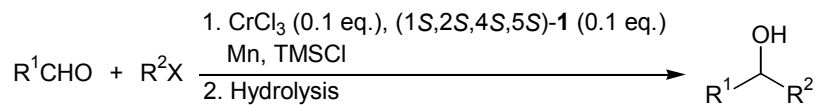
The NHK reaction affords the corresponding secondary alcohol in the presence of chromium chloride for reactions of aldehydes with aryl, alkynyl, alkenyl, allyl and propargyl halides. The reaction has been effectively applied for the carbon-carbon bond formation.<sup>1)</sup> Furthermore, since Fürstner *et al.* first reported that the reaction progresses with catalytic amounts of chromium chloride by adding manganese and chlorotrimethylsilane into the reaction system, it has been widely utilized.<sup>2)</sup>

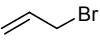
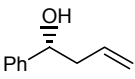
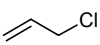
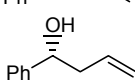
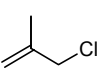
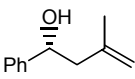
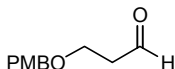
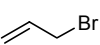
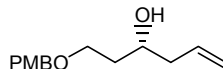


On the other hand, concerning enantioselective NHK reactions using asymmetric catalysts, Umani-Ronchi *et al.* reported a methodology using chromium-salen complexes. However this technique can be applied only to limited substrates.<sup>3)</sup> Recently, Berkessel *et al.* discovered that the separation of nitrogen atoms of the diamine moiety in the salen ligands used in the asymmetric NHK reaction has a significant affect on the catalytic properties. Thus, they developed salen ligand **1**, which exhibits a larger nitrogen-atom separation and includes the rigid structure DIANANE as a basic skeleton, and they utilized the ligand in asymmetric NHK reactions.<sup>4)</sup> According to their study, highly enantioselective yields of (*R*)-1-phenyl-3-buten-1-ol (90%*ee*) were obtained from benzaldehyde and allyl bromide. Furthermore, as a model reaction for applications in bioactive polyketide synthesis, reactions using *p*-methoxybenzyl (PMB)-protected 3-hydroxypropanal and allyl bromide exhibited high enantioselectivity (92%*ee*).

**Keywords** : DIANANE-salen ligand , asymmetric Nozaki-Hiyama-Kishi (NHK) reaction

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Entry	Aldehyde	Halide	Product	ee (%)	Y. (%)	Reaction Temp. (°C)
1	PhCHO			90	72	5
2	PhCHO			79	76	r.t.
3	PhCHO			54	78	r.t.
4				92	69	10

As shown above, chromium complexes of the DIANANE-salen ligand **1** can afford the desired products with high enantioselectivity and can be applied to a wide range of substrates in asymmetric NHK reactions. This allows **1** to be applied to the synthesis of bioactive compounds requiring highly enantioselective C-C bond formation reactions.

B2652	(1 <i>R</i> ,2 <i>R</i> ,4 <i>R</i> ,5 <i>R</i> )-2,5-Bis(3,5-di- <i>tert</i> -butyl-2-hydroxybenzylideneamino)bicyclo[2.2.1]heptane	100mg
B2653	(1 <i>S</i> ,2 <i>S</i> ,4 <i>S</i> ,5 <i>S</i> )-2,5-Bis(3,5-di- <i>tert</i> -butyl-2-hydroxybenzylideneamino)bicyclo[2.2.1]heptane	100mg

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