The Takai Olefination: Simple Access to E-Alkenyl Halides

Significance: In 1986 Takai and co-workers developed a simple procedure for the stereoselective preparation of E-alkenyl halides from various aldehydes by using an excess of CrCl₂ together with a haliform. The selectivity was dependent on the corresponding haloform and decreased in the order Cl > Br > I.

Comment: The mild reaction conditions enable highly chemoselective transformations. Thus, the olefination of an aldehyde proceeds smoothly in the presence of ketone moieties. Given the unique chemo- and stereoselectivity, several modifications and improvements of this method have been published over the years.

Selected examples:

- 87% yield, \(E/Z = 94:6\)
- 76% yield, \(E/Z = 94:6\)
- 78% yield, \(E/Z = 89:11\)
- 55% yield, \(E/Z = 89:11\)
- 55% yield, \(E/Z = 92:8\)
- 73% yield, \(E/Z = 81:19\)
- 75% yield
- 51% yield

Competition experiments:

- 75% yield, \(E/Z = 81:19\)
- 5% yield