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 haloform. 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:**

- **I**
  - 87% yield
  - $E/Z = 94:6$

- **Cl**
  - 76% yield
  - $E/Z = 94:6$

- **I**
  - 78% yield
  - $E/Z = 94:6$

- **Br**
  - 55% yield
  - $E/Z = 92:8$

- **Cl**
  - 55% yield
  - $E/Z = 92:8$

- **Br**
  - 73% yield
  - $E/Z = 89:11$

- **I**
  - 75% yield
  - $E/Z = 89:11$

- **I**
  - 51% yield

**Competition experiments:**

- **Br**
  - 75% yield
  - $E/Z = 81:19$

- **Cl**
  - 5% yield
  - $E/Z = 81:19$

**Reaction conditions:**

- R = Alk, alkenyl, Ar
- X = Cl, Br, I
- CHX₃ (2.0 equiv), CrCl₂ (6.0 equiv) or CrBr₃ (6.0 equiv), LiAlH₄ (3.0 equiv)
- THF, 0–65 °C, 0.5–21 h
- up to 87% yield
- $E/Z$ up to 95:5