

## Reduction of Styrene Compounds by Hydrogen Iodide

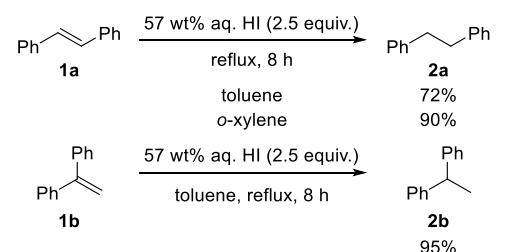
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Focused on the reduction ability of hydrogen iodide (HI), we have reported the chemoselective reduction of  $\alpha,\beta$ -unsaturated carbonyl and carboxylic compounds with aqueous HI through the addition of HI at olefin and reduction of C-I bond.<sup>1)</sup> Herein we report the reduction of styrene derivatives with aqueous HI.

When **1a** was treated with 57 wt% aqueous HI (2.5 equiv.) in toluene under refluxing conditions, **2a** was obtained in 72% yield (Scheme 1). The improvement of yield was achieved by changing solvent into *o*-xylene because of raising the temperature (b.p.: toluene, 110 °C; *o*-xylene, 145 °C). In the case of **1b**, the excellent yield (95%) was obtained in toluene.

**Scheme 1**



\* Yield was determined by <sup>1</sup>H NMR using *p*-chlorobenzaldehyde as an internal standard.

We also examined alkylated styrene derivative (**1c**). When the reaction was conducted with same conditions for **1a** and **1b**, the reduction proceeded to give **2c** in moderate yield (Table 1, Entry 1). No improvement of yield was observed by prolonged reaction time and raising temperature (Entries 2 and 3). In the case of toluene and *o*-xylene as a solvent, we found the generation of **3** which was formed by the addition of the solvent through Friedel-Crafts alkylation. When the solvent was exchanged into chlorobenzene (b.p.: 131 °C) to decrease the nucleophilic ability, the yield of **2c** was increased to give 71% yield (Entry 4). High temperature was required to give **2c** because lower yield of **2c** (31%) was observed at 80 °C accompanied with the iodinated compound, (1-iodoheptyl)benzene, in 65% yield (Entry 5).

**Table 1.** Reduction of **1c** with aq. HI

Entry	Solvent	Time (h)	Yield of <b>2c</b> (%) <sup>a)</sup>	Yield of <b>3</b> (%) <sup>a)</sup>
1	toluene	8	46	20
2	toluene	12	36	19
3	<i>o</i> -xylene	8	49	27
4	chlorobenzene	8	71	not detected
5 <sup>b)</sup>	chlorobenzene	8	31	not detected

a) Determined by <sup>1</sup>H NMR using *p*-chlorobenzaldehyde as an internal standard.

b) Reaction temperature was 80 °C. (1-iodoheptyl)benzene was obtained in 65% yield.

1) Matsumoto, S.; Marumoto, H.; Akazome, M.; Otani, Y.; Kaiho, T. *Bull. Chem. Soc. Jpn.* **2021**, *94*, 590.