



A Publication
of Reliable Methods
for the Preparation
of Organic Compounds

Working with Hazardous Chemicals

The procedures in *Organic Syntheses* are intended for use only by persons with proper training in experimental organic chemistry. All hazardous materials should be handled using the standard procedures for work with chemicals described in references such as "Prudent Practices in the Laboratory" (The National Academies Press, Washington, D.C., 2011; the full text can be accessed free of charge at http://www.nap.edu/catalog.php?record_id=12654). All chemical waste should be disposed of in accordance with local regulations. For general guidelines for the management of chemical waste, see Chapter 8 of Prudent Practices.

In some articles in *Organic Syntheses*, chemical-specific hazards are highlighted in red "Caution Notes" within a procedure. It is important to recognize that the absence of a caution note does not imply that no significant hazards are associated with the chemicals involved in that procedure. Prior to performing a reaction, a thorough risk assessment should be carried out that includes a review of the potential hazards associated with each chemical and experimental operation on the scale that is planned for the procedure. Guidelines for carrying out a risk assessment and for analyzing the hazards associated with chemicals can be found in Chapter 4 of Prudent Practices.

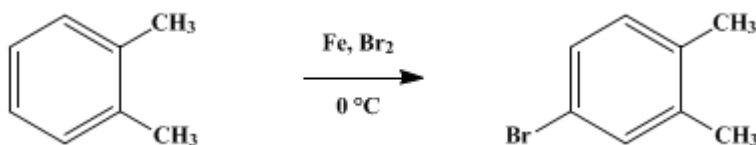
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These paragraphs were added in September 2014. The statements above do not supersede any specific hazard caution notes and safety instructions included in the procedure.

Organic Syntheses, Coll. Vol. 3, p.138 (1955); Vol. 28, p.22 (1948).

4-BROMO-*o*-XYLENE

[*o*-Xylene, 4-bromo-]



Submitted by W. A. Wisansky and S. Ansbacher.

Checked by N. L. Drake, Wilkins Reeve, and John Sterling, Jr..

1. Procedure

In a 1-l. three-necked flask having ground-glass joints are placed 500 g. (569 ml., 4.72 moles) of *o*-xylene, 12 g. of clean iron filings, and a crystal of iodine (Note 1). The flask is fitted with a dropping funnel, a stirrer (Note 2), and a condenser; a thermometer is suspended through the condenser on a platinum or Nichrome wire and arranged so that the bulb extends beneath the surface of the liquid. The top of the condenser is connected to a gas-absorption trap. The mixture is stirred and cooled in an ice-salt mixture, preferably under a hood. Six hundred and sixty grams (4.13 moles) of bromine is added drop-wise over a 3-hour period; during this time the internal temperature is maintained at 0° to -5° (Note 3). After all the bromine has been added the reaction mixture is allowed to stand overnight. It is poured into water and washed successively with a 500-ml. portion of water, two 500-ml. portions of 3% sodium hydroxide solution (Note 4), and one 500-ml. portion of water. The product is then steam-distilled; about 8 l. of distillate is collected (Note 5). The organic layer is separated from the water and dried over calcium chloride. The 4-bromo-*o*-xylene is distilled through a short column under reduced pressure, and the fraction boiling at 92–94°/14–15 mm. (n_D^{22} 1.5558) is collected. The yield is 720–745 g. (94–97%, based on bromine) (Note 6).

2. Notes

- Essentially the same yield results if only one of the catalysts (iron or iodine) is used.
- The checkers used a glycerol-sealed stirrer.
- In experiments in which the temperature of the reaction mixture was allowed to rise as high as +10°, the submitters noted a slight increase in the amount of dibromo-*o*-xylene formed.
- A dilute sodium bisulfite solution may be used instead of the alkali in this washing.
- Near the end of the steam distillation a white waxy product begins to collect in the condenser. This is apparently a dibromo-*o*-xylene.
- This material is of sufficient purity for most uses, including the conversion to 3,4-dimethylaniline (p. 307). It is reported¹ that the boiling point of the product can be raised slightly (from 211–212° to 214–215°/760 mm.) by sulfonation, recrystallization of the barium sulfonate, and regeneration of the bromo compound by acid hydrolysis.

3. Discussion

The procedure given was developed by Ghigi¹ from an earlier preparation by Jacobsen.² 4-Bromo-*o*-xylene has also been prepared from 3,4-dimethylaniline by the Sandmeyer reaction.^{3,4}

This preparation is referenced from:

- *Org. Syn. Coll. Vol. 3, 307*

1. Ghigi, *Ber.*, **71**, 684 (1938).
 2. Jacobsen, *Ber.*, **17**, 2372 (1884).
 3. Brand, Ludwig, and Berlin, *J. prakt. Chem.*, [2] **110**, 34 (1925).
 4. Kohlrausch and Pongratz, *Monatsh.*, **64**, 361 (1934).
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Appendix
Chemical Abstracts Nomenclature (Collective Index Number);
(Registry Number)

calcium chloride (10043-52-4)

sodium hydroxide (1310-73-2)

iron (7439-89-6)

bromine (7726-95-6)

sodium bisulfite (7631-90-5)

iodine (7553-56-2)

3,4-Dimethylaniline (95-64-7)

barium sulfonate

4-Bromo-o-xylene (583-71-1)

o-Xylene (95-47-6)

dibromo-o-xylene