



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.

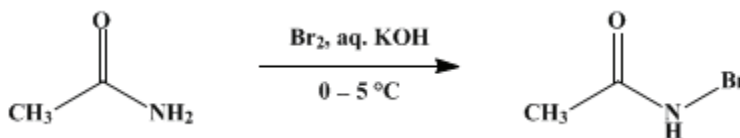
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These paragraphs were added in September 2014. The statements above do not supersede any specific hazard caution notes and safety instructions included in the procedure.

Organic Syntheses, Coll. Vol. 4, p.104 (1963); Vol. 31, p.17 (1951).

N-BROMOACETAMIDE

[Acetamide, N-bromo-]



Submitted by Eugene P. Oliveto and Corinne Gerold¹.
Checked by Richard T. Arnold and Carl G. Krespan.

1. Procedure

Twenty grams of acetamide (0.34 mole) is dissolved in 54 g. of bromine (0.34 mole) contained in a 500-ml. Erlenmeyer flask, and the solution is cooled to 0–5° in an ice bath. An ice-cold aqueous 50% potassium hydroxide solution is added in small portions with swirling and cooling until the color becomes a light yellow. Approximately 33–34 ml. of the caustic solution is required. The nearly solid reaction mixture is allowed to stand at 0–5° for 2–3 hours.

The mixture is treated with 40 g. of salt and 200 ml. of chloroform and warmed on the steam bath with vigorous swirling. After 2–3 minutes the clear red chloroform layer is decanted from the semisolid lower layer, and the extraction is repeated twice more with 200- and 100-ml. portions of chloroform respectively (Note 1). The combined extracts are dried over sodium sulfate, the solution is filtered by gravity through a fluted filter into a 2-l. Erlenmeyer flask, and 500 ml. of hexane is added with swirling. White needles of N-bromoacetamide begin to form at once (Note 2). After chilling for 1–2 hours, the crystals are collected with suction, washed with hexane, and air-dried. The yield is 19–24 g. (41–51%), m.p. 102–105° (Note 3), purity 98–100% (Note 4) and (Note 5).

2. Notes

- Six additional extractions, using 50-ml. portions of chloroform, may produce an increase in yield of 4–5 g.
- Occasionally it may be necessary to add seed crystals to promote crystallization.
- Material melting as much as 10° lower is sometimes obtained. However, it still has a purity of better than 96% as determined by thiosulfate titration (Note 4). This may indicate the presence of small amounts of N,N-dibromoacetamide.
- The purity is determined by titration with standard sodium thiosulfate solution. An accurately weighed sample of about 200 mg. is dissolved in water, and a solution of approximately 1 g. of potassium iodide in 10 ml. of water is added. The solution is acidified with 10 ml. of 10% sulfuric acid and titrated with 0.1N thiosulfate to the starch end point.

$$\% \text{ N-bromoacetamide} = \frac{\text{ml. S}_2\text{O}_3^{2-} \times \text{normality} \times 69 \times 100}{\text{weight of sample (mg.)}}$$

- The product is unstable and should be stored in a cool place protected from light.

3. Discussion

N-Bromoacetamide has been prepared from acetamide and bromine in the presence of potassium hydroxide,^{2,3} zinc oxide,⁴ or calcium carbonate.⁴

References and Notes

1. Schering Corporation, Bloomfield, New Jersey.
 2. Behrend and Schreiber, *Ann.*, **318**, 371 (1901).
 3. Hofmann, *Ber.*, **15**, 407 (1882).
 4. Likhosherstov and Alekseev, *J. Gen. Chem. U.S.S.R.*, **3**, 927 (1933).
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Appendix
Chemical Abstracts Nomenclature (Collective Index Number);
(Registry Number)

sulfuric acid (7664-93-9)

Acetamide (60-35-5)

chloroform (67-66-3)

bromine (7726-95-6)

sodium sulfate (7757-82-6)

potassium iodide (7681-11-0)

sodium thiosulfate (7772-98-7)

calcium carbonate (471-34-1)

potassium hydroxide (1310-58-3)

zinc oxide

hexane (110-54-3)

N-Bromoacetamide,
Acetamide, N-bromo- (79-15-2)

N,N-dibromoacetamide