

CHEM 101 Laboratory Exercise #5 Laboratory Notebook

Synthesis of Tetramethylammonium Triiodide and Tetramethylammonium pentaiodide

Using Microsoft Word, students must write their in-lab notes below while completing the Laboratory exercise. The Laboratory notebook must be uploaded to the CHEM 101 Lab Brightspace site as a readable .pdf by the end of the lab period. Please see page 7 of the 202405 CHEM 101 lab manual for all the information required in the in-lab notes. The documentation below must reflect the student's work without assistance from others.

Name: Arfaz Hossain Lab Section: B12 Quad: 2 Date: June 18, 2024

In-lab Notes:

Procedure:

In the lab experiment, tetramethylammonium triiodide (NMe_4I_3) and tetramethylammonium pentaiodide (NMe_4I_5) were synthesized by reacting iodine (I_2) with tetramethylammonium iodide (NMe_4I) in a controlled stoichiometry. Approximately 0.519 g of NMe_4I and 0.531 g of I_2 were weighed for the triiodide synthesis, and 0.515 g of NMe_4I and 1.317 g of I_2 were weighed for the pentaiodide synthesis. The reactants were dissolved in 12 mL of 95% ethanol, with the mixture gently heated on a hot plate with stirring until complete dissolution occurred. After cooling, crystalline products were obtained (4.119 g NMe_4I_3 and 1.417 g NMe_4I_5). Vacuum filtration was performed using a Buchner funnel and filter paper to separate the crystals from the filtrate, washing them twice with hexanes. For performing the Vacuum filtration, the Buchner flask was clamped, and the vacuum source was connected through a secondary trap. A Buchner funnel with a rubber sleeve was inserted into the flask, and filter paper was placed in the funnel and moistened with the solution using a stir rod. The vacuum pump was turned on, and the solution and crystals were carefully poured into the funnel, allowing the filtrate to be collected. After filtration, the crystals were rinsed with a wash solvent and suction were reapplied to remove the solvent. The crystals were left to dry under vacuum for 10 minutes, and the samples were collected and weighed accurately for further analysis. This method allowed for the controlled synthesis and isolation of tetramethylammonium triiodide and pentaiodide salts.

Products:

The synthesis yielded two distinct crystalline products: tetramethylammonium triiodide (NMe_4I_3) and tetramethylammonium pentaiodide (NMe_4I_5). Tetramethylammonium triiodide was obtained as a dark brown to black crystalline solid, with a yield of 4.119g. Similarly, tetramethylammonium pentaiodide was obtained as a dark brown to black crystalline solid, with a yield of 1.417g.

Reference:

1. Reimer, M. et al, Laboratory Manual, Chemistry 101, pp. 19-24. (University of Victoria: Victoria, B.C.) **Summer 2024**
2. Tetramethylammonium iodide. Aldrich, 6000 N Teutonia Ave, Milwaukee, WI 53209, Lot #MKCF7632.
3. Iodine. Bio Basic Inc., 20 Konrad Crescent, Markham, ON L3R 8T4, Lot #N9812260.
4. Hexane. Anachemia, 12000 Trans-Canada Hwy, Montreal, QC H9B 3H7, Lot #23H1761046.