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Oxidation of benzoin to benzil lab report

Preparation of benzil from benzoin by oxidation reaction. Oxidation of benzoin to benzil mechanism. Oxidation of benzoin to benzil using nitric acid mechanism. Preparation of benzil from benzoin lab report. Oxidation of benzoin to benzil. Lab Preparation of Benzil: A Green Chemistry Approach The aim of this experiment is to prepare Benzil through the oxidation of Benzoin using copper (II) acetate in an aqueous ammonium nitrate solution, focusing on a green chemistry approach. At the end of the reaction, a white colorless powder was collected via vacuum filtration. The isolated product weighed 0.23g, allowing for a percent yield calculation. Its melting point range was determined, resulting in a value that was compared to the literature value for Benzil (120-121°C). IR spectra of the product showed a peak around 1700 cm^{-1} indicating the presence of a carbonyl group and a peak around 3600 cm^{-1} suggesting the presence of an alcohol. However, the IR spectra also revealed impurities in the product due to contamination with starting material. Introduction Traditionally, the oxidation of Benzoin to Benzil has been performed using nitric acid as the oxidizing agent, resulting in products still contaminated with unreacted Benzoin. In this experiment, we employed a mild oxidizing agent, copper (II) acetate, in an aqueous ammonium nitrate solution. Reaction Mechanism The Cu(II) ion oxidizes Benzoin while reducing to Cu(I), which is then re-oxidized by the ammonium nitrate, resulting in the formation of Cu(II) and nitrite ions. This system utilizes Cu(I) as a catalyst, continually remade during the oxidation process. Results IR Spectra of Benzoin and Product (Benzil) The IR spectrum of the product shows a peak around 1700 cm^{-1} indicating the presence of a carbonyl group, suggesting that the product is contaminated with starting material. Calculations Weight of Crude Benzil: 23.00g; Yield: 70%. Discussion According to the lab manual, this experiment is considered successful when Benzil is produced through oxidation and crystallization of Benzoin. The isolated product weighed 0.23g, allowing for a percent yield calculation. The high yield obtained in this experiment was due to its focus on a greener approach. The melting point range implies that the product might be contaminated with Benzil. Multi-Step Synthesis, Step 1: Benzil by Oxidation of Benzoin with Copper (II) Acetate The purpose of this lab report is gaining familiarity with multi-step synthesis, involving the oxidation of an Alpha-hydroxyketone to a diketone. Using a 10-mL graduated cylinder, carefully add 1.5 mL of concentrated nitric acid to a round-bottom flask. Connect an air condenser and securely clamp both the flask and condenser in place. Within a hood, set up a hot water bath with a thermometer, allowing it to boil for about one hour while stirring moderately. If gas evolution persists after the initial hour, continue heating for an additional 15 minutes before cooling the mixture by removing the heat source and detaching the air condenser. Using a Pasteur pipette, transfer the reaction mixture to a small beaker containing 4 mL of ice-cold water. Clean the round-bottom flask and spinning vane with a small amount of water, then cool the mixture in an ice bath until crystals form. If the material oils out instead of crystallizing, gently scratch the oil with a glass rod to initiate crystallization. Collect the crude product on a Buchner funnel under vacuum, washing it thoroughly with approximately 5 mL of cold water to remove excess nitric acid. Finally, weigh the solid and calculate the percent yield of the crude product, also determining its purity.