Oxidation of benzoin to benzil lab report

Oxidation of benzoin to benzil mechanism. Benzoin to benzil equation. Oxidation of benzoin to benzil. Preparation of benzil from benzoin by oxidation reaction. Oxidation of benzoin to benzil using nitric acid mechanism.

Experiment 4: Synthesizing Benzyl from Benzoin Presented by Prof. Sonali R. Pawar, Medicinal Chemistry I B. Pharmacy IV semester Title: Synthesis of Benzyl from Benzoin Objective: To synthesize and submit Benzyl from Benzoin. Procedure: [Ref: Vogel's textbook of practical organic chemistry, 5th edition] Combine 1 g (0.0047 mol) of crude benzoin with 5 ml of concentrated nitric acid in a 250-ml round-bottomed flask. Heat the mixture on a boiling water bath for about 1.5 hours or until the evolution of oxides of nitrogen has ceased. Then, pour the reaction mixture into 50-100 ml of cold water and stir well to allow the oil to crystallize completely as a yellow solid. Filter the crude benzyl at the pump and wash it thoroughly with water to remove the nitric acid. Finally, recrystallize from ethanol or rectified spirit (about 2.5 ml per gram). Yield of pure benzyl, m.p. 94-96 °C: ______ g Theory: The alcohol group of benzoin is oxidized to a ketone group, forming benzil in the presence of concentrated nitric acid. Nitration of the aromatic ring does not occur because sulphuric acid is absent throughout the process. Role of nitric acid: Nitric acid serves as an oxidizing reagent to convert benzoin into benzil through an oxidation reaction. Uses: Benzil is commonly used as a pharmaceutical intermediate, insecticide, and curing agent. It finds its main application in organic synthesis, particularly as a photoinitiator in polymer chemistry. Principle: The oxidation of the α-hydroxyketone with concentrated nitric acid or catalytic amounts of copper(II) salts in acetic acid solution yields the diketone benzil. Calculations: * Molecular weight of benzoin: 212.24 g/mol * Molecular weight of benzil: 210.23 g/mol * Weight taken of benzoin: 1 g/mol * Practical yield: 0.92 g * Theoretical yield: molecular weight of benzil x weight of benzoin taken / molecular weight of benzoin = 210.23 g/mol x 1 g/mol / 212.24 g/mol = 0.99 g * Percentage yield: practical yield / theoretical yield x 100% = 92% Note: This report was interrupted due to suspected bot activity. Please ensure that cookies and JavaScript are enabled before reloading the page to regain access. The Oxidation of Benzoin to Benzil: A Laboratory Synthesis Benzoin undergoes oxidative cleavage in the presence of nitric acid and sulfuric acid to produce benzil. This laboratory procedure outlines the steps involved in synthesizing benzil from benzoin. ## Materials and Apparatus Benzoin, nitric acid (HNO_3), sulfuric acid (H_2SO_4), ice bath, distillation apparatus, filtration setup, crystallization dishes ## Procedure 1. Dissolve benzoin in nitric acid. 2. Cool the reaction mixture in an ice bath. 3. Add sulfuric acid dropwise to initiate oxidation of benzoin to benzil. 4. Neutralize and filter the reaction mixture to obtain benzil. ## Calculations 1. Molar mass calculation: Calculate molar mass of benzoin using atomic masses of C, H, and O. 2. Theoretical yield calculation: Use balanced chemical equation to calculate theoretical yield of benzil. 3. Percent yield calculation: Determine experimental yield by weighing crystalline product, then calculate percent yield using formula. ## Results 1. Observations: Color change in reaction mixture indicates progress of reaction; formation of crystals during crystallization is observed. 2. Quantitative analysis: Actual yield of benzil obtained by weighing crystalline product; percent yield calculated and compared to theoretical yield. ## Discussion The oxidation mechanism involving nitric acid and sulfuric acid was discussed, emphasizing the role of each reagent in converting benzoin to benzil. To synthesize benzil from benzoin, ensuring its purity was crucial. We assessed the product's purity by analyzing its melting point and comparing it to literature values. Possible sources of error, like incomplete reactions or impurities, were considered to understand variations between theoretical and actual yields. Our laboratory successfully produced benzil through careful experimentation, comparing theoretical and actual yields for insights into reaction efficiency. To ensure the product's identity and purity, we recommended a melting point determination and compared it to literature values (94-95°C). Any deviation from this expected melting point may indicate impurities. Throughout the experiment, prioritizing safety precautions was essential due to the use of corrosive substances and toxic fumes. Work in a well-ventilated hood, wear appropriate personal protective equipment, and handle reagents with care. The test for unoxidized benzoin involves a complex reaction between benzil and a product of auto-oxidation of benzoin, resulting in a dark brown or black color. A negative test result indicates the successful completion of the oxidation process. Recrystallization can be used as a purification method by keeping the mixture hot until complete dissolution of the solid, adding water dropwise to induce cloudiness, and collecting crystals through vacuum filtration. To calculate the percent yield, we determined the theoretical yield and compared it with the actual yield obtained in the experiment. Reporting the yield and percent yield of benzil is essential, as well as addressing any specific instructions from the instructor regarding additional measurements or assessments of last week's product. Acknowledging potential sources of error, such as variations in reagent concentrations, incomplete reactions, or experimental conditions, can help understand discrepancies between theoretical and actual yields. Our experiment was successful in synthesizing and purifying benzil, demonstrating fundamental principles of organic chemistry. Future work could focus on optimizing reaction conditions or exploring alternative methods for synthesizing benzil. The preparation of Benzil through oxidation of Benzoin using copper (II) acetate as an oxidizing agent represents a green chemistry approach, aiming for minimal waste and environmental impact. By replacing traditional nitric acid methods with this more environmentally friendly technique, researchers can create products with reduced impurities, such as unreacted benzoin, thereby increasing the purity and yield of Benzil. This study demonstrates an effective synthesis pathway by leveraging copper (II) acetate's ability to catalyze the oxidation process without producing harmful by-products, highlighting a method that not only yields quality results but also adheres to sustainable practices in chemical synthesis.