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Formation of benzil from benzoin

Benzil chemical formula. Benzil derivatives. Benzil uses. Benzil formula. Mechanism of benzil from benzoin. Preparation of benzil from benzoin by oxidation reaction. Principle of synthesis of benzil from benzoin. Benzil.

Preparation of Benzil Benzil is prepared by oxidizing the alcohol group in benzoin using concentrated nitric acid, resulting in the formation of a ketone group. This process does not involve the nitration of the aromatic ring. **Procedure** 1. Combine 20 g of benzoin and 100 ml of concentrated nitric acid in a round-bottom flask. 2. Heat the mixture on a boiling water bath for 1.5 hours with occasional shaking until the evolution of nitrogen oxides ceases. 3. Pour the content into 300-400 ml of ice-cold water and shake well. 4. Filter the product under suction and wash it with cold water. 5. Recrystallize the product from ethanol (2.5 ml/g) to obtain benzil. **Calculations** The limiting reagent is benzoin, so the yield should be calculated based on its amount. The molecular formula of benzoin is C14H12O2 and that of benzil is C14H10O2. **Theoretical Yield** 20 g of benzoin will form 19.8 g of benzil (95.9% theoretical yield). **Synthesis and Yields** Benzil was synthesized, and the percentage yield was found to be 95.9%. **References** The procedure is described in various textbooks, including Vogel's Textbook of Practical Organic Chemistry and Practical in Organic Chemistry by Hitesh G. Raval et al. The chemical compound benzil, also known as Bz2 or 1,2-diphenylethane-1,2-dione, is a yellow solid with the formula (C6H5CO)2. It's commonly abbreviated as (PhCO)2 and is one of the most common diketones. Benzil serves primarily as a photoinitiator in polymer chemistry due to its ability to absorb ultraviolet radiation at 260 nm, leading to decomposition and formation of free-radical species that facilitate cross-linking within materials. However, it's considered a relatively poor photoinitiator and is rarely used because it undergoes photobleaching, which limits its effectiveness. In contrast, acetal derivatives like 2,2-dimethoxy-2-phenylacetophenone exhibit better properties for this application. Beyond its role in polymer chemistry, benzil also shows potential as an inhibitor of human carboxylesterases, enzymes involved in the hydrolysis of carboxylesters and various clinically used drugs. Furthermore, benzil is a standard building block in organic synthesis, capable of condensing with amines to form diketimine ligands. It's also involved in the benzilic acid rearrangement, a classic organic reaction where base catalyses its conversion into benzilic acid, a process exploited in the preparation of the drug phenytoin. Additionally, benzil reacts with 1,3-diphenylacetone through an aldol condensation to produce tetraphenylcyclopentadienone. Benzil is typically prepared from benzoin using copper(II) acetate as a suitable oxidizing agent. Benzil (also known as diphenylethane-1,2-dione) can undergo a chemical conversion that utilizes ferric chloride (FeCl3) as an inexpensive catalyst. This process has been studied and documented in various scientific publications, including those in the Acta Crystallogr. B43 398 (1987), Spectrochim. Acta A60 (8-9) 1805 (2004), and Journal of Chemical Education (1988). The conversion of benzil into other compounds has also been explored using different methods and catalysts, such as copper(II) acetate and metal-free conditions in water. These studies highlight the importance of understanding the chemical properties and reactions of benzil in various contexts.