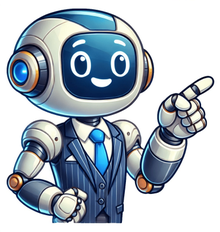
I'm human



Benzoic acid is a common aromatic carboxylic acid with the chemical formula C6H5COOH. It is found in natural resin gum benzoin and can be synthesized through various reactions. This compound has several applications, including as a preservative and in the production of cosmetics, dyes, and plastics. Benzoic acid can be produced through the reaction of benzyl alcohol or benzaldehyde with alkaline KMNO4. It also reacts with phenyl cyanide and carbon dioxide to form intermediate products. The compound is widely used as an ingredient in many products, such as face wash, mouthwash, toothpaste, and cosmetics. Benzoic acid can be produced through different methods, including the hydrolysis of benzene trichloride or the catalytic oxidation of toluene. It has a melting point of 122°C and is sparingly soluble in cold water but soluble in hot water, ether, and alcohol. Benzoic acid reacts with bases like sodium hydroxide and sodium carbonate to form salts, while it reacts with sulphuric acid to form esters. It also reacts with ammonia to produce benzamide and phosphorous pentachloride to form benzoyl chloride. The compound is used as a precursor for the synthesis of many organic compounds. Benzoic acid has several applications in the pharmaceutical industry, including the treatment of bacterial and fungal infections. It is also used as a food preservative and disinfectant for bronchial tubes. Additionally, it is a major component of face wash, mouthwash, and toothpaste. Converting benzene to benzoic acid is a vital process in organic chemistry, crucial for the synthesis of various industrial chemicals and pharmaceuticals. Understanding this conversion is essential for chemists and chemical engineers. Economical Process of Converting Benzene to Benzoic Acid This process involves elevated temperatures and pressures, leading to continuous production of benzoic acid. Purification of Benzoic Acid follows, where contaminated product from oxidation is purified by recrystallization. This method involves dissolving the compound in hot water and allowing pure crystals to form after cooling. The conversion process has a significant impact on various industries. Benzoic acid is used as a precursor for producing chemicals and food preservatives, as well as plastics and resins. Understanding this process allows chemists to efficiently produce valuable compounds for diverse applications. First, toluene undergoes oxidation in order to form a crucial functional group found within benzoic acid. The subsequent step involves utilizing various oxidizing agents; however, potassium permanganate ($KMnO_4$) is often employed due to its effectiveness. This process typically occurs at elevated temperatures, facilitating the complete transformation of the methyl group into a carboxyl group: [\text{C}6\text{H}5\text{CH}3 + 2 \text{KMnO}4 + 2 \text{H}2\text{O} \rightarrow \text{C}6\text{H}5\text{COOH} + 2 \text{MnO}2 + 2 \text{KOH}] After the oxidation step, the reaction mixture usually contains benzoic acid along with by-products such as manganese dioxide (MnO_2) and potassium hydroxide (KOH). To isolate pure benzoic acid, the mixture is typically acidified using a strong acid like hydrochloric acid (HCl), causing the benzoic acid to precipitate out. The precipitate is then filtered and recrystallized from hot water to obtain pure benzoic acid crystals. Transforming benzene into benzoic acid is an essential process in organic chemistry, involving two primary steps: introducing a methyl group onto benzene to produce toluene through Friedel-Crafts alkylation, followed by the oxidation of toluene to form benzoic acid. Each step demands precise control over reaction conditions to ensure high yields and purity of the final product. Understanding this conversion provides valuable insights into fundamental organic reactions and highlights its significance in industrial applications.

Preparation of benzoic acid from toluene. How can benzene be prepared from benzoic acid. Benzene to benzoic acid in one step. Preparation of benzene from sodium salt of benzoic acid. Preparation of benzoic acid from alkyl benzene. Explain the preparation of benzene from sodium salt of benzoic acid. Give reaction for the preparation of benzene from benzoic acid and phenol. Preparation of benzoic acid. Preparation of benzoic acid from ethyl benzene.