Citric acid is a weak organic acid that is naturally found

in citrus fruits such as lemons, limes, and oranges. It is a key intermediate in the citric acid cycle (Krebs cycle), which is essential for cellular respiration in all aerobic organisms.

Chemical Properties

1. **Structure:**
   - Citric acid has three carboxyl (-COOH) groups and one hydroxyl (-OH) group attached to a central carbon chain. This structure allows it to function as a tricarboxylic acid.
2. **pH and Acidity:**
   - It is a weak acid with a pKa of 3.13 for the first dissociation, 4.76 for the second, and 6.40 for the third. In aqueous solutions, it partially dissociates, contributing to its acidity.
3. **Solubility:**
   - Citric acid is highly soluble in water, with a solubility of approximately 148 grams per 100 milliliters at room temperature. It is also soluble in ethanol but less so in organic solvents like acetone or ether.
4. **Chelating Properties:**
   - It acts as a chelating agent, meaning it can bind to metal ions, such as calcium or magnesium, forming complexes. This property is useful in water softening, food preservation, and cosmetics.
5. **Thermal Decomposition:**

- When heated, citric acid decomposes at temperatures above 175°C, releasing carbon dioxide and water, and leaving behind a residue of carbon. This property is useful in some industrial processes where controlled thermal decomposition is required.

6. **Buffering Capacity:**
   - Due to its multiple carboxyl groups, citric acid can act as a buffer, helping to maintain a stable pH in solutions. This makes it useful in pharmaceuticals, food, and cosmetic formulations.
7. **Reactivity:**
   - Citric acid can react with bases to form salts, known as citrates. These salts, such as sodium citrate or potassium citrate, are often used as emulsifiers, preservatives, or pH regulators.
8. **Oxidation:**
   - Although relatively stable, citric acid can be oxidized to form carbon dioxide and water in the presence of strong oxidizing agents.