



**Glycolic acid** is the simplest alpha-hydroxy acid (AHA) and is widely used in skincare products due to its effective exfoliating properties. It is naturally derived from sugar cane but can also be synthesized. Glycolic acid is highly valued in dermatology and cosmetics for its ability to improve skin texture and tone.

## **Chemical Properties**

1. **Structure:**

- Glycolic acid has a simple structure with two carbon atoms. The molecule consists of a hydroxyl group (-OH) attached to the alpha carbon, which is adjacent to the carboxylic acid group (-COOH).
- The presence of both the hydroxyl and carboxylic acid groups gives glycolic acid its unique chemical properties.

2. **Solubility:**

- Glycolic acid is highly soluble in water, which makes it easy to formulate in aqueous-based skincare products.
- It is also soluble in alcohols and some organic solvents, but its solubility in non-polar solvents is limited.

3. **Acidity:**

- Glycolic acid is a relatively strong acid among AHAs, with a pKa of around 3.83. This indicates that it readily dissociates in water to release hydrogen ions (H<sup>+</sup>), contributing to its acidic nature.
- When used in skincare, the pH of glycolic acid formulations is usually adjusted to ensure safety and efficacy, often ranging between 3.0 and 4.0.

4. **Exfoliating Properties:**

- Glycolic acid's small molecular size allows it to penetrate the skin more easily than other AHAs. It works by breaking down the bonds between dead skin cells, promoting their removal and revealing fresher, smoother skin underneath.

- This property makes it effective in treating various skin conditions such as hyperpigmentation, fine lines, acne, and uneven skin texture.
- 5. **Hygroscopic Nature:**
  - Glycolic acid is hygroscopic, meaning it can attract and retain moisture from the environment. This property can help increase skin hydration when used in lower concentrations in skincare products.
- 6. **Chemical Reactivity:**
  - Glycolic acid can react with bases to form glycolate salts, which are sometimes used in different industrial and cosmetic applications.
  - It can also undergo esterification reactions with alcohols, producing glycolic esters, which may be used in some formulations.
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