

# Glycolic Acid: History, Manufacturing, and Its Role in Concrete Removers

## Introduction

Glycolic acid is one of the most widely used organic acids in industrial cleaning and descaling applications. As the smallest alpha-hydroxy acid (AHA), glycolic acid provides a unique combination of strong cleaning performance and relatively low corrosivity compared to mineral acids such as hydrochloric acid. Because of these characteristics, it has become an important component in many industrial formulations including metal cleaning, oilfield chemicals, personal care products, and particularly **concrete removers** used in the ready-mix concrete industry.

Today, glycolic acid is produced globally, but supply chains are highly concentrated. **Only one manufacturer in all of North America produces glycolic acid**, located in **Belle, West Virginia**, and this facility provides **more than 50% of the global supply**. The remaining supply is produced primarily in **China and India**, using different manufacturing processes that often lead to higher impurity levels and inconsistent product quality.

Understanding the history, production methods, and global manufacturing landscape of glycolic acid helps explain why it is such an effective and preferred ingredient in modern concrete removal solutions.

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## Discovery and Early History

Glycolic acid was first identified in the **19th century**, originally isolated from sugar cane juice. Because of this origin, it was sometimes referred to as “**sugar acid**.” Chemically, glycolic acid ( $C_2H_4O_3$ ) is the simplest hydroxycarboxylic acid, consisting of both a hydroxyl group and a carboxylic acid group. This dual functionality allows it to interact strongly with mineral deposits, metal oxides, and cementitious materials.

During the early 20th century, researchers discovered glycolic acid’s ability to dissolve scale and mineral deposits without causing the extreme corrosion associated with strong mineral acids. This led to its early use in **industrial descaling and cleaning formulations**.

Commercial-scale production began in the mid-1900s when **DuPont** developed processes to manufacture glycolic acid more efficiently for industrial use. Over the decades, the glycolic acid business transitioned through several corporate changes. The glycolic acid technology and production assets eventually became part of **Chemours**, which later transitioned the business to **PureTech Scientific**, the current operator of the Belle, West Virginia facility.

Today, this facility represents the **longest continuously operating glycolic acid production technology in the world**, with over **85 years of production expertise**.

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## **Manufacturing Methods for Glycolic Acid**

There are two primary industrial methods used globally to manufacture glycolic acid. The method used has a significant impact on product purity, corrosivity, and overall performance.

### **Continuous Carbonylation Process (North America)**

The glycolic acid produced in Belle, West Virginia uses a **single-step continuous carbonylation process** starting from formaldehyde intermediates. This manufacturing process produces **methyl glycolate intermediates which are then converted to glycolic acid in a controlled continuous system**.

This process offers several key advantages:

- Continuous production rather than batch processing
- Very high purity product
- **No chlorides present**
- **No dichloroacetic acid (DCA) contamination**
- Consistent product quality

The Belle, WV facility is notable because it is the **only continuous glycolic acid manufacturing facility in the world**.

Because of the absence of chloride impurities, this glycolic acid is significantly less corrosive to metals commonly used in industrial equipment.

Testing has shown that glycolic acid produced using this method can be:

- **Over 300× less corrosive to aluminum**
- **14× less corrosive to copper**
- **Nearly 30× less corrosive to stainless steel**

when compared to glycolic acid produced through alternative manufacturing routes.

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## Chloroacetic Acid Hydrolysis (China, India, Europe)

The most common manufacturing route used overseas involves **batch hydrolysis of chloroacetic acid**. While this process can produce glycolic acid, it introduces several challenges.

Key characteristics of this process include:

- Batch processing rather than continuous
- Residual **chloride contamination**
- Formation of **dichloroacetic acid (DCA)** impurities
- Less consistent product quality

Because chlorides are inherently corrosive, glycolic acid produced through this route tends to cause greater corrosion to metal surfaces and equipment.

This difference in manufacturing technology is one of the primary reasons why **North American-produced glycolic acid is considered the premium grade for industrial applications**, particularly those involving sensitive equipment or high-value assets.

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## Global Manufacturing Landscape

The global glycolic acid market is dominated by a small number of producers. However, manufacturing capacity is highly concentrated.

### North America

- **PureTech Scientific – Belle, West Virginia**
- Only producer in the Americas
- Supplies **more than 50% of the global market**

### Asia

- Several manufacturers in **China**
- Smaller production in **India**

### Europe

- Some historical production, but much of Europe now relies on imports.

The Belle, WV plant is therefore strategically important for global supply. It exports glycolic acid worldwide, including to **Europe, the UK, and Asia-Pacific markets**.

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## Why Glycolic Acid is Preferred in Concrete Removers

Concrete removal products historically relied on **hydrochloric acid (muriatic acid)** because of its fast reaction with cement. However, hydrochloric acid presents several major drawbacks:

- Severe corrosion to metal surfaces
- Damage to truck finishes and painted equipment
- Discoloration of plastics and components
- Safety hazards for operators
- Accelerated future buildup due to surface etching

Glycolic acid offers a significantly improved alternative.

### Advantages in Concrete Removal

Glycolic acid works by reacting with calcium compounds in cement and dissolving the hardened deposits. However, unlike strong mineral acids, it does so in a more controlled manner.

Benefits include:

- **Lower corrosion rates on metals**
- Safe for aluminum, stainless steel, and carbon steel
- Less damage to paint and equipment finishes
- Reduced labor and mechanical cleaning requirements
- Improved safety for operators
- Reduced long-term equipment wear

Testing comparing glycolic acid to phosphoric acid and hydrochloric acid shows dramatically lower corrosion rates across common metals used in concrete equipment.

Because of these benefits, glycolic acid-based concrete removers have become widely used for:

- Ready-mix concrete truck cleaning
  - Construction equipment maintenance
  - Tool cleaning
  - Heavy industrial descaling
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# Conclusion

Glycolic acid has evolved from a niche chemical originally isolated from sugar cane to a globally important industrial acid used in numerous applications. Its unique combination of cleaning strength and low corrosivity makes it particularly well suited for modern concrete removal formulations.

The manufacturing process plays a critical role in determining the quality and performance of glycolic acid. The **continuous carbonylation process used in Belle, West Virginia produces a high-purity product free from chloride contaminants**, resulting in significantly lower corrosion and greater consistency compared to material produced using chloroacetic acid hydrolysis overseas.

With over **85 years of production expertise**, the Belle facility—originally associated with DuPont and later Chemours, and now operated by PureTech Scientific—remains the **only glycolic acid manufacturer in the Americas and the largest supplier globally**.

For industries such as ready-mix concrete, this high-purity glycolic acid provides a safer, more effective, and less corrosive alternative to traditional acids, helping extend equipment life while improving cleaning efficiency.