

Glypure™

Cosmetic-Grade Glycolic Acid

Comparison of High Purity Glycolic Acids from Different Routes of Manufacture

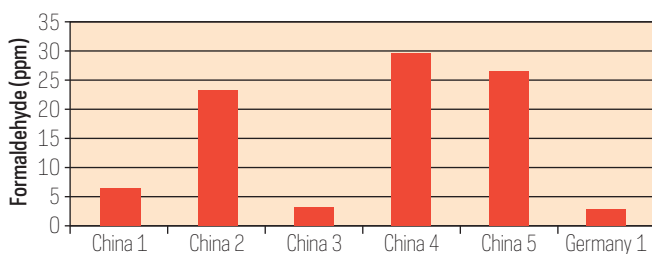
Product Information

Chemours completed a detailed analytical study of impurities from all known routes of glycolic acid manufacture. Several companies have made claims that their glycolic acid products are “formaldehyde free” and/or “formic acid free.” This study proves that these product claims are unfounded.

The study gathered samples from the three commercial routes of glycolic acid manufacture:

- Monochloroacetic acid neutralization
- Glycolonitrile reaction
- Continuous high pressure/high temperature route unique to Chemours

No Source of Glycolic Acid Is Formaldehyde Free



The high purity samples were grouped by grade: 70% solution, 99% crystalline, and partially neutralized 70% solution.

The 70% high purity samples analyzed were from one German producer, five Chinese producers/marketers, and Chemours.

The 99% crystalline samples were from five Chinese producers/marketers and Chemours.

Partially neutralized glycolic acid samples were collected from a U.S.-based distributor/marketer of Chinese-produced material and Chemours.

Key Findings of the Study

- All samples had measurable quantities of formaldehyde.
- All 70% and 99% samples had measurable quantities of formic acid.
- Several of the 70% solutions made via the monochloroacetic acid (MCA) route not only had significantly higher quantities of total chlorine, but also had measurable quantities of halogenated organic compounds. Two of the 70% solutions had over 100 ppm of dichloroacetic acid (DCA). DCA is California Prop 65 listed as a carcinogen and male reproductive toxin. It is also IARC 2B listed as a potential human carcinogen. One non-U.S. 70% sample had detectable, but not quantifiable, traces of monochloroacetic acid and trichloroacetic acid as well. Both partially neutralized samples from the U.S. distributor/marketer of off-shore material had detectable levels of dichloroacetic acid. Halogenated organics not only carry safety and stewardship concerns, but varying levels can impact formulation quality and consistency.
- One of the 99% crystalline samples appeared to be contaminated with a fluorinated compound. The 99% sample in question has a contaminate that appeared to be 2,2,2 trifluoroacetamide. Batch manufacture without dedicated equipment or sufficient quality assurance resources creates opportunities for quality and consistency issues.

High Purity Glycolic Acid Analytical Results

70% Samples	China 1	China 2	China 3	China 4	China 5	Germany 1	Chemours
Total Acid (%)	70.46%	69.43%	71.05%	71.31%	71.63%	69.57%	71.67%
Formaldehyde (ppm)	6.41	23.43	3.18	29.37	26.64	2.83	8.31
Formic Acid (ppm)	22.8	42.6	9.6	49.8	9.4	11.6	32.7
Total Chlorine (ppm)	79.1	ND	713	4.3	1.9	360	ND
Dichloroacetic Acid (ppm)	110	ND	130	ND	ND	ND	ND

99% Samples	China 1	China 2	China 3	China 4	China 5	Chemours
Total Acid (%)	98.20%	99.65%	97.02%	99.67%	99.17%	99.40%
Formaldehyde (ppm)	0.32	0.84	1.02	0.39	0.88	2.00
Formic Acid (ppm)	9.2	7.9	12.4	8.1	12.7	13.0
Total Chlorine (ppm)	6.4	ND	48.3	ND	ND	ND
2,2,2 Trifluoroacetamide (ppm)	290	ND	ND	ND	ND	ND

Partially Neutralized Samples	U.S. Marketer of Chinese Material	U.S. Marketer of Chinese Material	Chemours	Chemours
pH	4.4	3.8	4.4	3.8
Total Acid (%)	49.88%	48.67%	49.00%	53.17%
Formaldehyde (ppm)	5.64	5.32	3.83	7.67
Total Chlorine (ppm)	41.2	34.6	ND	ND
Dichloroacetic Acid (ppm)	55	Detected	ND	ND

ND = None detected

Background

There are three known routes of glycolic acid manufacture:

- Neutralization of monochloroacetic acid practiced by several companies in Germany, China, and India
- Reaction involving glycolonitrile practiced by one or two Chinese companies
- Continuous high pressure, high temperature practiced by Chemours

The Chemours route is a continuous 24/7 operation, while the other two routes are batch processes with no dedicated equipment.

For more information, visit glypure.com or call (800) 441-9593.

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