

CO₂e Passport

Citric acid monohydrate

CAS No. 5949-29-1

Certificate owner:

co2explorer@brenntag.com

Delivery to:

Messeallee 11, 45131 Essen, Germany

Confidentiality / Disclaimer

These CO₂e emissions calculations (hereinafter referred to as the “Calculator”) are provided by Brenntag SE or a company affiliated with Brenntag SE pursuant sec. 15 et seq. German Stock Corporation Act (hereinafter referred to as “Brenntag”) as a non-binding orientation for your convenience and only as an estimation of the carbon balance of the corresponding product (“carbon footprint”). Such carbon footprints are based on data-based assumptions, the data quality of which has been reviewed, but that are only for the purpose of estimating a carbon footprint in order to be able to identify improvement potentials.

Calculated PCFs based on Brenntag’s methodology are not suitable for comparative assessments with other sources. Nevertheless, the information and calculations provided are for information purposes only and are provided without any representation or warranty for correctness, actuality, or completeness. They do not constitute exact measurements of carbon emissions, nor an agreed quality of products.

The Calculator incorporates PCF values from ISO-compliant secondary and primary data, and transportation CO₂e emissions as per GLEC framework. The incorporated data are of the highest available quality and not older than 5years. Current warehousing emissions are available only on a country level and calculated as follows: Real warehouse CO₂e emissions ÷ total volume throughput warehouses per country.

The methodology has been formally certified by TÜV Rheinland, to be in accordance with ISO 14067:2018 and TFS Guideline for PCF calculations (ID-Nr. 0000085724).



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CO₂e emissions profile (cradle-to-your-gate)

Specific emissions profile including biogenic GWP100 [kg CO₂e/kg]: **1.32 (kg CO₂e/kg)***

CO ₂ e emissions	Value	Unit
Including biogenicC GWP100	1.32	kg CO ₂ e/kg
Excluding biogenicC GWP100	1.23	kg CO ₂ e/kg
BiogenicC GWP100**	0.09	kg CO ₂ e/kg
Fossil GWP100	1.23	kg CO ₂ e/kg
Land use GWP100	0.01	kg CO ₂ e/kg
BiogenicC content**	0.12	kg
C content, fossil	0.55	kg

Total emissions profile including biogenic GWP100 [kg CO₂e/1000kg]: **1.320 (kg CO₂e)**

* Declared unit is based on 1 kg of product “packed or bulk”

** Might be n/a if data are insufficient to correctly estimate the value

Which emissions are included?

Product	Yes
Transportation	Yes
Warehousing	Yes
Packaging	Yes

Allocation method use: Mass-allocation

Allocation approach for waste incineration with energy recovery: Cut-off

Regional scope

Global

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GHG and GWP: An overview

Greenhouse gases (GHGs) play a significant role in global warming and climate change. The greenhouse gases considered in PCF calculations encompass both non-fluorinated gases, occurring naturally, such as Carbon Dioxide (CO₂), Methane (CH₄), and Nitrous Oxide (N₂O), and fluorinated gases, primarily of human-made origin, including Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF₆), and Nitrogen Trifluoride (NF₃).

To assess and compare the impact of different GHGs, scientists use a metric called Global Warming Potential (GWP), which is expressed in CO₂-equivalents (CO₂e).

GWP measures the radiative forcing of a greenhouse gas relative to that of carbon dioxide over specific time horizons, which can be 20 (GWP20), 100 (GWP100), or 500 (GWP500) years.

The GWP100 is commonly used for calculating product carbon footprints and environmental assessments because it aligns with typical timescales for evaluating climate impact.

The GWP100 values included in our databases refer to what's provided in the latest IPCC (Intergovernmental Panel on Climate Change) assessment report available.

CO₂e emissions impact factors

- **Including biogenicC GWP100:** This impact factor considers the GWP100 of both biogenic carbon emissions and other greenhouse gases (GHGs) ones.
- **Excluding biogenicC GWP100:** This impact factor excludes the GWP100 from biogenic carbon. It only considers the GWP100 impact of non-biogenic GHGs.
- **Fossil GWP100:** This impact factor quantifies the GWP100 of fossil carbon emissions compared to the same amount of carbon dioxide. Fossil carbon originates from decomposed organic matter, such as coal, oil, and natural gas.
- **Land use GWP100:** This impact factor quantifies the net effect of land use changes on greenhouse gas emissions and sequestration. This includes factors like deforestation, land conversion, and changes in agricultural practices, which can contribute to the release or absorption of carbon dioxide and other greenhouse gases.
- **BiogenicC GWP100:** Biogenic emissions are greenhouse gas emissions based on a biological source, i.e. is based on the CO₂e emission uptake process, during plant growth. This is a standalone term that specifically refers to the warming impact of biogenic carbon emissions that originated from biological sources.
- **C content, fossil:** This term refers to the amount of fossil-based carbon present in a material or product. Fossil carbon originates from decomposed organic matter that has been buried for millions of years, like coal or oil.

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Certification, limitation, and use

The product carbon footprint (PCF) calculations follow the requirements and guidance given by ISO 14067: 2018 and TFS: 2022.

In a methodology review, TÜV Rheinland has confirmed that the PCF methodology developed and used by Brenntag SE reflects the state of the art (ID-Nr. 0000085724).

Validity: Brenntag PCFs are updated on request. Database updates are carried out as follow:

Data source	Relevance	Update frequency
Secondary data	Products	Minimum Yearly - can be more frequently, based on availability
Brenntag	Warehousing	Yearly
GLEC Framework	Transportation	Upon availability - usually Yearly
Others	Packaging	Minimum Yearly - can be more frequently, based on availability
Others	Products	Upon availability

Calculation date: 01/01/1901

Expiry date: (calculation date +365 days)

Background data are not older than 5 years.

Verification approach: Internal LCA expert - TÜV Rheinland certificate based on ISO 14067:2018 and TFS PCF Guideline (Version 2.0).

Data Quality

Data source	DQR
Secondary data	Minimum: 2 fair
Brenntag	2 fair
Primary data	1 good

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