

Environmental Product Declaration



In accordance with ISO 14025:2006 for:

Acrylates, Butyl and 2-ethylhexanol ester of acrylic acid (BA and 2-EHA)

from

SIBUR

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



Programme information

Programme:	The International EPD® System
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
PCR 2021:03 Basic chemicals. Version 1.1.2 UN CPC Group 341
PCR review was conducted by: The Technical Committee of the International EPD® System. See https://www.environdec.com/about-us/the-international-epd-system-about-the-system .
Life Cycle Assessment (LCA)
LCA accountability: LCA and the EPD prepared by CIS Center LCA team: (<i>Dmitrii Vadivasov, Valentina Luzanova, Olga Reshetar</i>)
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: <input checked="" type="checkbox"/> EPD verification by individual verifier Third-party verifier: <i>Dr Hüdai Kara, Metsims Sustainability Consulting (www.metsims.com)</i> Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see ISO 14025

Company information

Owner of the EPD:

SIBUR LLC is the managing organization of PJSC "SIBUR Holding"
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Description of the organisation:

SIBUR is one of the most dynamically developing companies in the global petrochemical industry, a Russian leader in the production of polymers and rubbers.

SIBUR produces popular products for society and uses advanced technologies to create new opportunities, invests in social infrastructure, improving the quality of life of people. SIBUR develops through partnership and exchange of experience, constant growth, movement towards ambitious goals and commitment to the principles of sustainable development.

The company's products are used in many sectors of the economy around the world: construction, food industry, medicine and pharmaceuticals, agriculture, automotive industry and others.

JSC SIBUR-Neftekhim is a modern production site of SIBUR. The production site accepts ethylene, propylene and other feedstocks and produces petrochemical products from them. The production structure of the company includes production of ethylene oxide and glycols, as well as production of acrylic acid, light (methyl acrylate) and heavy (butyl acrylate and 2-ethylhexyl acrylate) acrylic esters.

Name and location of production site:

JSC SIBUR-Neftekhim
Avtozavodskoe highway, building 65, Dzerzhinsk, 606000, Nizhny Novgorod region

Product information

Product name:

Acrylates, Butyl and 2-ethylhexanol ester of acrylic acid (BA and 2-EHA)

Product identification:

Butyl acrylate (BA) is produced in accordance with the following basic technical specifications:

JSC SIBUR-Neftekhim
- TS 2435-045-52470175-2012

2-ethylhexyl acrylate (2-EHA) is produced in accordance with the following basic technical specifications:

JSC SIBUR-Neftekhim
- TS 2435-054-52470175-2016

A complete list of technical specifications and product standards can be requested directly from the manufacturer.

Product description:

Butyl acrylate is the butyl ester of acrylic acid. BA is colorless, flammable liquid with a strong odor, highly soluble in organic solvents (ethers, benzene, ethanol), poorly soluble in water, and forms azeotropic mixtures with water and alcohols.

Under the influence of initiators, light, and heat, BA polymerizes and copolymerizes well.

The main raw materials for BA are acrylic acid, as well as butanol, sulfuric acid and caustic soda.

2-ethylhexyl acrylate is a colorless liquid with a pleasant odor, which is produced with a high yield by esterification of acrylic acid with 2-ethylhexanol and a strong acid.

2-ethylhexyl acrylate polymerizes easily. The chemical, physical, and toxicological properties, however, can be greatly modified by additives or stabilizers.

The main raw materials for 2-EHA are acrylic acid, as well as 2-ethylhexanol and caustic soda.

To produce BA and 2-EHA, JSC SIBUR-Neftekhim uses acrylic acid of its own production.

Product specification:

BA and 2-EHA are the most important and popular acrylic esters.

Butyl acrylate is used to obtain: acrylic emulsions; paint and varnish materials; synthetic latexes; varnishes

2-ethylhexyl acrylate is used to obtain: plastics; acrylic dispersions; latexes for various purposes.

UN CPC code: 341

CAS number:

Butyl acrylate 141-32-2

2-ethylhexyl acrylate 103-11-7

Geographical scope: Russia, Global

The structure of electricity generation sources used in the main production process of averaged PE corresponds to the structure of generation sources in Russia for 2022.



LCA information

Functional unit / declared unit:

The declared unit used for the EPD is one ton of BA + 2-EHA averaged.

Reference service life:

The guaranteed shelf life of BA and 2-EHA is one year from the date of manufacture.

Time representativeness:

2022

Database(s) and LCA software used: OpenLCA version 1.9.0 and secondary datasets from the current versions of the "Environmental Footprint" and Ecoinvent databases.

Description of system boundaries:

In accordance with PCR, the product life cycle can be divided into three life cycle stages (PE product system):

- Upstream processes (from "cradle to gate"),
- Core process (from gate to gate),
- Downstream processes (from "gate to grave").

The collection of upstream, core and downstream processes related to the BA and 2-EHA life cycle constitute the boundaries of the BA and 2-EHA product system.

Assumptions and excluded lifecycle stages

The following assumptions were made in this study:

- To model the life cycle of BA and 2-EHA, only the main inputs and outputs are considered. The mass of flows excluded from the modelling does not exceed 5% of the total mass of BA and 2-EHA products and 1% of the mass of flows of the main production process. The contribution to the environmental impacts of excluded flows does not exceed 1% of the total life cycle impacts of BA and 2-EHA.
- It was assumed that datasets with a representative year (the year for which the data was collected) different from the representative year for the primary data would be suitable for BA and 2-EHA life cycle modelling and would not significantly impact the final study results.

Allocation:

At the production site, primary data for BA and 2-EHA and acrylic acid production were collected. Emissions of pollutants, generated production waste and consumed energy resources were distributed between the material flows at the output of the corresponding technological process and distributed among the products at the output of this process based on the volume (mass) of their production (allocation by mass).

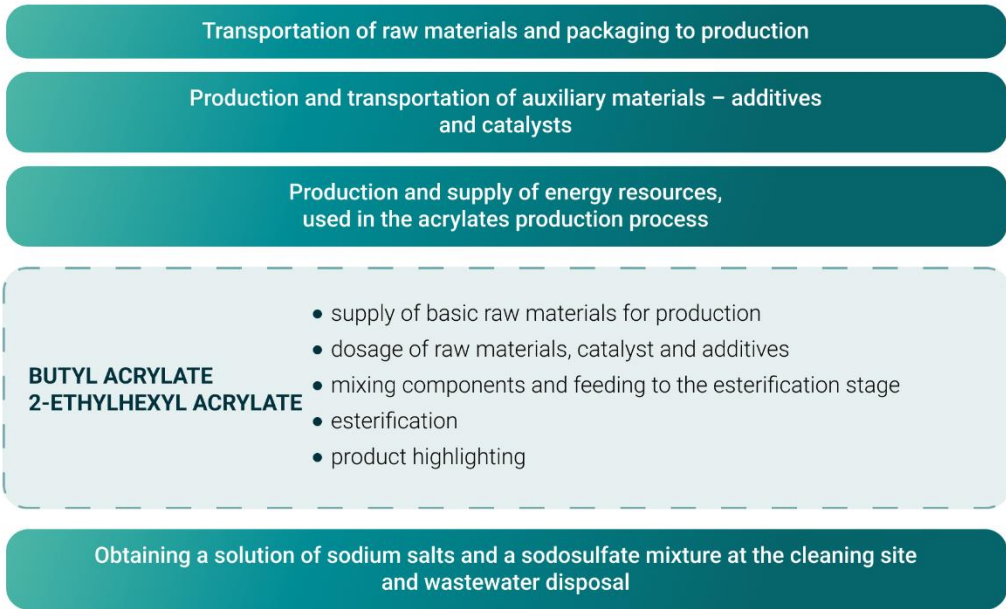
System diagram:



UPSTREAM PROCESSES. SUPPLY OF RAW MATERIALS



CORE PROCESS. PRODUCTION OF ACRYLIC ACID ESTERS



DOWNSTREAM PROCESSES. DELIVERY OF FINISHED PRODUCTS



Content declaration

Product components	kg	%	Environmental / hazardous properties
BA + 2-EHA	1000	100	Non-Hazardous
TOTAL	1000		

Packaging

BA and 2-EHA are supplied to consumers in bulk in their containers, so packaging is not a part of the product system.



Results of the environmental performance indicators

Impact category indicators for 1 tonne of BA + 2-EHA

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	2.71E+03	5.95E+01	1.76E+02	2.95E+03
	Biogenic	kg CO ₂ eq.	1.81E+00	1.77E-02	1.08E-01	1.94E+00
	Land use and land transformation	kg CO ₂ eq.	1.85E+00	7.67E-02	4.36E-01	2.36E+00
	TOTAL	kg CO ₂ eq.	2.72E+03	5.96E+01	1.77E+02	2.95E+03
Ozone layer depletion (ODP)		kg CFC 11 eq.	7.27E-05	1.68E-07	2.49E-10	7.29E-05
Acidification potential (AP)		mol H ⁺ eq.	5.75E+00	1.24E-01	8.58E-01	6.73E+00
Eutrophication potential (EP)	Aquatic freshwater	kg P eq.	7.38E+03	9.91E+01	2.31E+01	5.81E-01
	Aquatic marine	kg N eq.	9.71E-01	1.92E-02	1.57E-01	1.15E+00
	Aquatic terrestrial	mol N eq.	1.36E+01	2.21E-01	1.71E+00	1.55E+01
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	1.20E+01	8.95E-02	5.34E-01	1.26E+01
Abiotic depletion potential (ADP)*	Metals and minerals	kg Sb eq.	3.47E-03	1.19E-05	7.53E-05	3.56E-03
	Fossil resources	MJ, net calorific value	9.94E+04	7.37E+02	1.45E+04	1.15E+05
Water deprivation potential (WDP)*		m ³ world eq. deprived	4.44E+04	8.78E+00	3.06E+00	4.44E+04

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Resource use indicators for 1 tonne of BA + 2-EHA

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1.50E+03	3.16E+01	5.59E+01	1.59E+03
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	3.21E+04	3.06E+02	1.84E+03	3.42E+04
	Used as raw materials	MJ, net calorific value	3.09E+03	0.00E+00	1.38E+03	1.38E+03
	TOTAL	MJ, net calorific value	2.39E+04	0.00E+00	1.13E+04	1.13E+04
Secondary material (optional)		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (optional)		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels (optional)		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (optional)		m ³	1.73E+03	1.75E-01	1.62E+00	1.62E+00

Waste indicators for 1 tonne of BA + 2-EHA

PARAMETER	UNIT	Upstream	Core	Downstream	TOTAL
Hazardous waste disposed	kg	1.10E-04	1.07E-06	6.23E-05	1.73E-04
Non-hazardous waste disposed	kg	1.00E+00	5.30E-02	1.75E+00	2.81E+00
Radioactive waste disposed	kg	1.45E-02	1.22E-03	8.98E-03	2.47E-02

Additional environmental information

JSC SIBUR-Neftekhim has an integrated management system for quality, occupational safety and health, and environmental protection. The plant is certified for compliance with management systems according to ISO 9001, ISO 14001, ISO 45001.

References

General Programme Instructions of the International EPD[®] System. Version 4.0.
PCR 2021:03 Basic chemicals. 1.1.2



