Oilfield solutions

Improving performance and sustainability

Corbion purac

- Good Scale remover
- High solubility of hard water salts
- Building block for cross-linkers
- Low toxicity

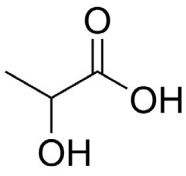
The oil industry constantly searches for products to improve performance and reduce processing costs. In addition, the pressure to use environmentally-benign products is growing. The cost of cleaning up and disposal of waste streams continuously increases. Corbion's unique biobased products provide a significant contribution to fulfilling these needs. Corbion Purac has been producing lactic acid and derivatives through white biotechnology for over 80 years. Our products have a biocontent of up to 100%. They can reduce your CO_2 footprint, are readily biodegradable and will not bioaccumulate. The functionalities of our product range include descaling, pH adjustment and building blocks to synthesize customized polymers or crosslinkers. Alongside our standard products, we can develop new lactic acid derivatives with properties tailored to the specific needs of your application.

Product Range

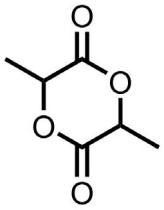
PURAC®	Lactic acid
PURALACT®	Lactide
PURASOLV® EL	Ethyl lactate
PURASOLV® BL	n-Butyl lactate
PURASOLV® EHL	2-Ethylhexyl lactate

Applications

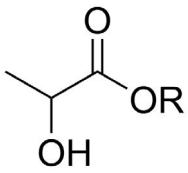
Lactic acid and derivatives are used in several applications, such as descaling, cleaning cuttings, fracturing and desalination. Lactic acid is also used to produce metal lactates, when applied as active cross-linkers in drilling- and fracking operations.



PURAC® Lactic acid



PURALACT® Lactide



PURASOLV® Lactate

R =C_2H_5 (ethyl)

R =C_4H_9 (butyl)

R=C_8H_{17} (2-ethylhexyl)

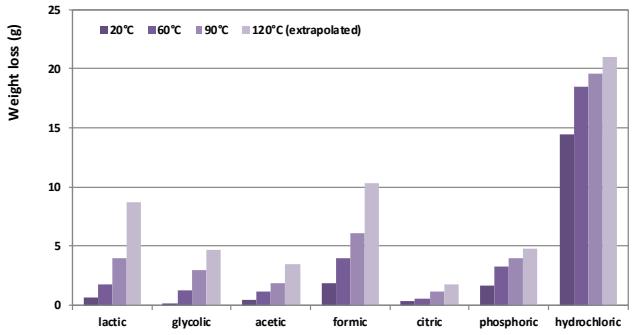


Figure 1. $CaCO_3$ Scale removal efficacy

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Descaling

Lactic acid is an effective scale remover, while retaining its low corrosive properties. Figure 1 shows the effectiveness of lactic acid as a scale remover at different temperatures, measured by weight-loss of a calcium carbonate ($CaCO_3$) block. At 120°C/248°F the performance of lactic acid exceeds glycolic, acetic, phosphoric and citric acid. In addition, salts from lactic acid are highly soluble in water (see Table 1).

Temperature (°C/°F)	Solubility Calcium lactate (g/100 g water)
5 / 41	5,7
20 / 68	8,1
60 / 140	37,9
80 / 176	136,6

Table 1. Solubility of hard water salt

Corrosivity

Lactic acid is very mild on constructional metallic materials, compared to other acids, as shown in Figure 2. In addition, the volatility of lactic acid is very low, resulting in reduced impact of corrosion due to acidic vapors

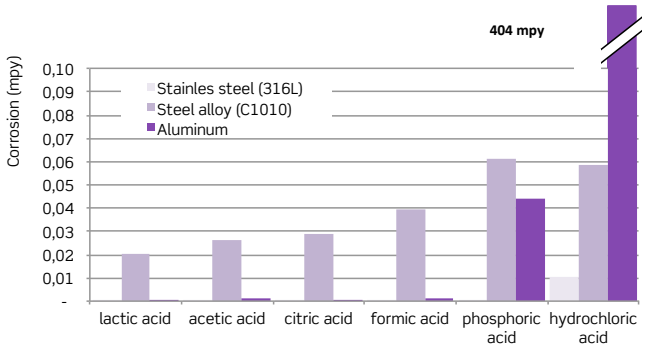

Figure 2. Corrosivity (mpy)

Regulatory & Safety Aspects

Lactic acid is safe, readily biodegradable and easy to handle. It is readily biodegradable and will not impact the Biological Oxygen Demand (BOD) or Chemical Oxygen Demand (COD) of formulated products. Transport of lactic acid can also provide benefits, as it does not have a transport classification.

		Lactic acid	Acetic acid	Citric acid	Formic acid	Glycolic acid	Hydrochloric acid	Phosphoric acid
Regulatory								
CAS no.		79-33-4	64-19-7	77-92-9	64-18-6	79-14-1	7647-01-0	7664-38-2
EC no.		201-196-2	200-580-7	201-069-1	200-579-1	201-180-5	231-595-7	231-633-2
TSCA registration		yes	yes	yes	yes	yes	yes	yes
Transport classification		none	8	none	8	8	8	8
Toxicity								
LD50/oral/rat	mg/kg	3534	3310	3000	1100	1938	900	EP
LD50/dermal/rat	mg/kg	>2000	1060	n.a.	n.a.	n.a.	1449	USP
Toxicity								
BOD_5	mg02/mg	0,45	0.34 - 0.88	0,42	0,086	n.a.	n.a.	n.a.
COD	mg02/mg	0,9	1,03	0,728	0,348	n.a.	n.a.	n.a.
EC50/Algae	mg/l	2800	n.a.	640	n.a.	164	n.a.	n.a.
EC50/48h/Daphnia	mg/l	130	>100	100	34	141	n.a.	n.a.
ILC50/48h/Fish*	mg/l	130	75	760	5000	93	3,6	3,5

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For chemical industry, Corbion Purac offers Lactic Acid and Lactic Acid derivatives like lactate esters, mineral and metal salts. Corbion Purac's products are biodegradable and generally recognized as safe for human beings, animals and the environment. Lactic acid is an interesting ingredient that can be used to replace fossil based acids in a very wide range of applications e.g. agro chemicals, metal plating, textile and leather. Corbion operates 10 production plants, in the USA, the Netherlands, Spain, Brazil and Thailand, and markets its products through a worldwide network of sales offices and distributors.

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