

ENZYMATIC TRANSFORMATION

GREEN CHEMISTRY



BIOCATALYSIS CREATES GREEN CHEMISTRY

ABOUT US:

Fermenta Biotech Limited (Fermenta), founded in 1986, is a pioneer in immobilized enzyme technology with the mission to contribute to the emerging transformation of biocatalysis. Fermenta's objective is to identify, validate, patent, and commercialize enzyme based technologies for green manufacturing. The enzyme manufacturing unit in Kullu and the DBT approved R&D facility in Thane have consistently developed and sustained Fermenta's leadership in providing advanced enzyme technologies.

PRODUCTS:

Variants of Penicillin G amidase (CAS 9014-06-6), *Thermomyces lanuginosus* lipase (CAS 9001-62-1), and *Candida antarctica* lipase (CALB) (CAS 9001-62-1) are versatile biocatalysts. CALB lipase is widely used in green fuels and chiral chemistry to catalyse specific organic transformations. These enzymes display high substrate specificity with low impurity profile suitable in aqueous, suspension and solvent phase media enabling reusability and recyclability.



FERMASE PA850

PENICILLIN G AMIDASE CATALYST

Product type

FERMASE PA850 is based on improved covalent immobilization technique of highly purified enzyme on macroporous epoxy acrylate beads. The enzyme is obtained from non- pathogenic, non-toxic *E.coli* strain with enhanced penicillin G amidase activity. It is supplied as insoluble, wet spherical beads with uniform particle size distribution.

Description

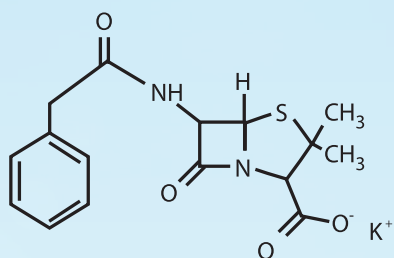
White or cream to pale yellow spherical beads with defined particle size distribution. The color may vary from batch to batch and the color intensity is not an indication of the product quality.

Advantages

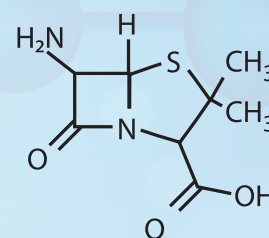
- Very high specific activity and selectivity
- High operational stability & recyclability

Application

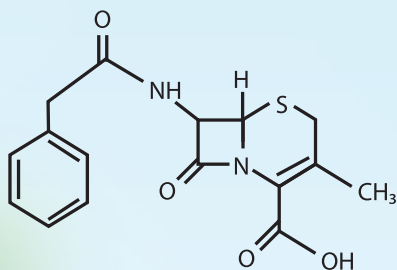
Synthesis of betalactam intermediates like 6-APA, 7-ADCA, and 7-AVCA



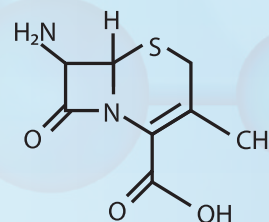
Penicillin G Potassium Salt (PenG)



6-Amino Penicillanic Acid (6-APA)



Cephalosporin G (CephG)



7-Amino Deacetoxy Cephalosporonic Acid (7-ADCA)

Dry weight

32-35 %

Particle size

100–500 µm > 98.0%, 50–100 µm < 2.0%

Enzyme activity

Not less than 250 Units per gram wet weight & 850 Units per gram dry weight.

Unit definition (U/g)

Amount of enzyme catalyzing the formation of one micromole of 6- aminopenicillanic acid at 37°C, pH 8.0 at 2 % (w/v) Penicillin G initial concentration, in the milieu of 50 mM Sodium Phosphate buffer, within the range of zero order kinetics.

Storage & Product stability

Cool and dry conditions are recommended for storage. The recommended temperature for storage is below 10°C. When stored under these conditions, the product will maintain its declared activity for at least 12 months. Do not freeze!

Material support data

- Technical Data Sheet
- Material Safety Data Sheet
- Certificate of Analysis

Safety

FERMASE PA850 is very safe to handle. Avoid raising dust and contact with skin and eyes. Take up spilled dust by mechanical means. Avoid forming aerosols, wash contaminated clothing & ensure sufficient ventilation.

Packing size

Bulk pack size: 20 kg



Manufactured by :
Fermenta Biotech Limited

A-1501, Thane One, DIL Complex, Ghodbunder Road,
Majiwade, Thane (West) 400 610, Maharashtra, India

Product type

FERMASE PS250 is based on improved covalent immobilization technique of highly purified Penicillin G acylase enzyme obtained from *Achromobacter* sp. on epoxy acrylate polymer beads. It is supplied as insoluble, wet spherical beads with uniform particle size distribution.

Description

Cream to brown regularly shaped beads with uniform particle size distribution. Colour may vary from batch to batch and the colour intensity is not an indication of the product quality.

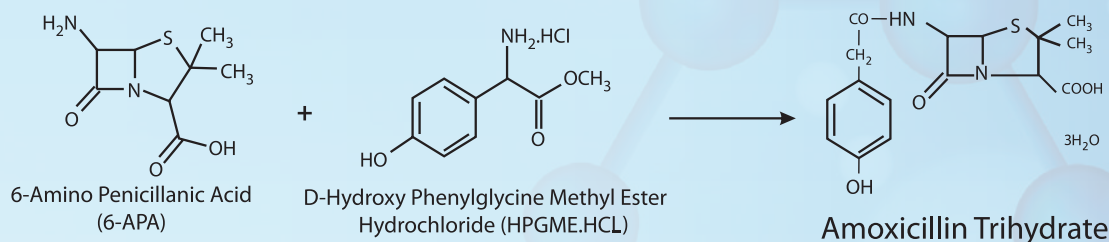
Advantages

- Higher Amoxicillin synthesis activity
- Longer stability
- Faster reaction rate
- Lower ester hydrolysis

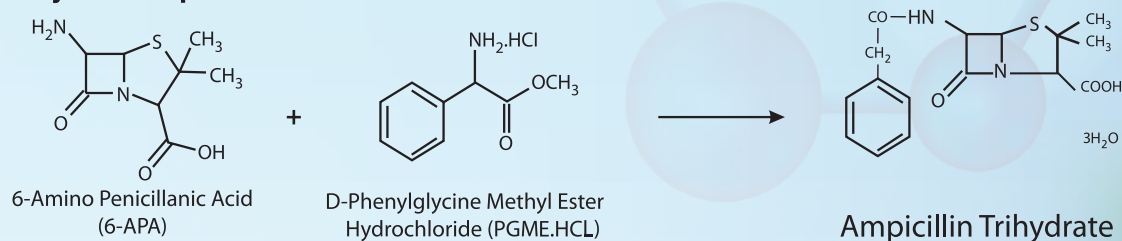
Application

It is used for the synthesis of amoxicillin and ampicillin.

Enzymatic Amoxicillin



Enzymatic Ampicillin



Particle size

250-500 μm > 95.0 %

Enzyme activity

NLT 50 units per g dry Penicillin G Hydrolysis

Dry weight

NLT 40%

Unit definition (U/g)

Amount of enzyme catalyzing the formation of one micromole of 6- aminopenicillanic acid at 37°C, pH 8.0 at 2 % (w/v) Penicillin G initial concentration, in the milieu of 50 mM Sodium Phosphate buffer, within the range of zero order kinetics.

Storage & Product stability

Cool and dry conditions are recommended for storage. The recommended temperature for storing is below 10°C. When stored under these conditions, the product will maintain its declared activity for at least 12 months.

Material support data

- Technical Data Sheet
- Material Safety Data Sheet
- Certificate of Analysis

Safety

FERMASE PS250 is very safe to handle. Avoid raising dust and contact with skin and eyes. Take up spilled dust by mechanical means. Avoid forming aerosols, wash contaminated clothing & ensure sufficient ventilation.



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A-1501, Thane One, DIL Complex, Ghodbunder Road,
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Product type

Biocatalyst CAL B 10 L is a recombinant *Candida antarctica* lipase B enzyme expressed in *Pichia pastoris* cells. It is supplied as formulated enzyme equilibrated with buffer and permitted preservatives.

Description

Biocatalyst CALB 10L is a yellowish-green to green solution. Colour may vary from batch to batch and the colour intensity is not an indication of the product quality.

Advantages

- High enzymatic activity
- High stability
- Higher selectivity

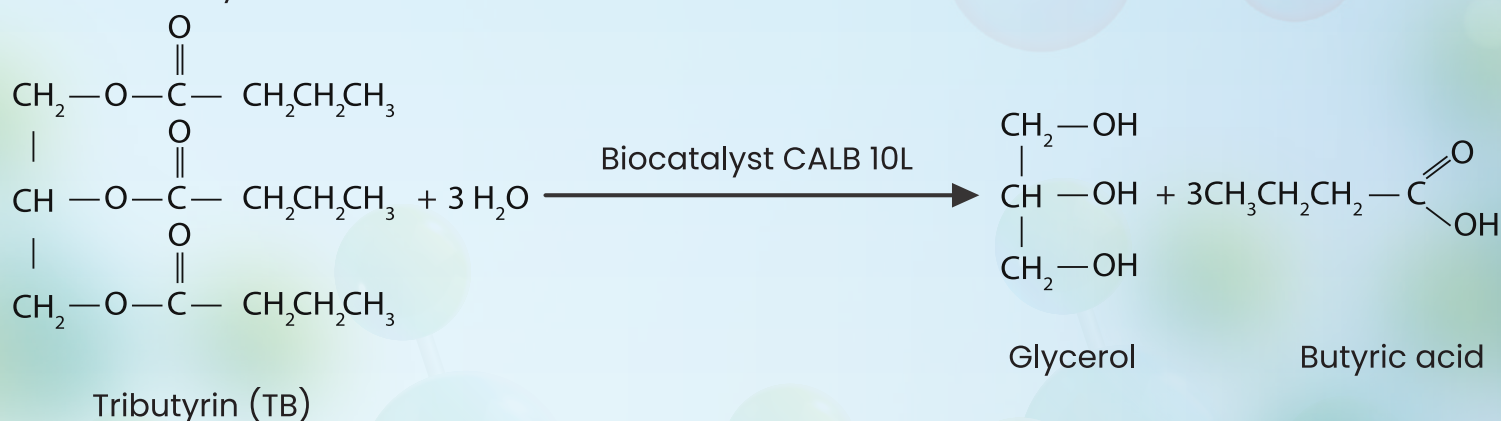
Information

Character	Value
Enzyme Activity	> 10'000 TBU/mL (Tributyryn hydrolysis)
TBU definition	Amount of enzyme catalyzing the formation of 1 µmol of butyric acid at 40°C, pH 7.5 at 10% (v/v) Tributyrin concentration per minute per mL enzyme in the milieu of 100 mM sodium phosphate buffer pH 7.5.

Application

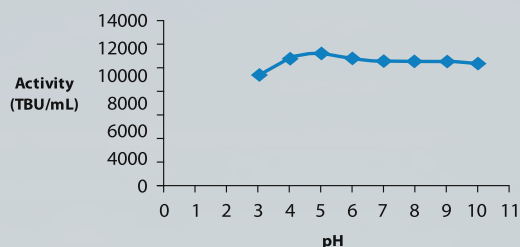
- Enantioselective hydrolysis and synthesis of esters and amides, and transesterification reactions
- Versatile applications in the APIs, pharmaceutical, food, organic chemistry, flavours, fragrances, and the production of omega-3 fatty acids

For TBU activity

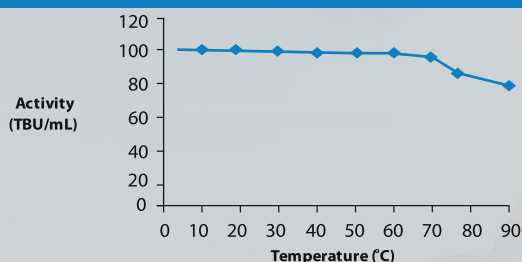


BIOCATALYST CALB 10L PROFILE

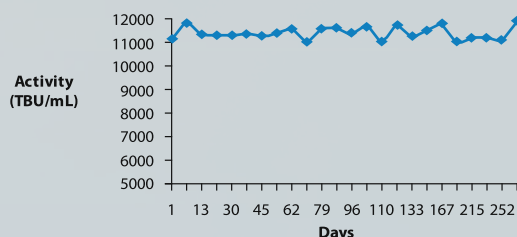
pH stability



Temperature stability



Storage stability (at 5°C)



Storage & Product stability

Cool and dry conditions are recommended for storage. The recommended temperature for storage is between 5°C – 8°C.

When stored under these conditions, the product will maintain its declared activity for at least 12 months.

Safety

Biocatalyst CALB 10L is very safe to handle. Avoid raising dust and contact with skin and eyes. Take up spilled dust by mechanical means. Avoid forming aerosols, wash contaminated clothing & ensure sufficient ventilation.

Packing size

- Minimum pack size: 1 kg
- Bulk pack size: 25 kg

Certificates

- Halal
- Kosher



Manufactured by :
Fermenta Biotech Limited

A-1501, Thane One, DIL Complex, Ghodbunder Road,
Majiwade, Thane (West) 400 610, Maharashtra, India

BIOCATALYST CALBTA10000

CANDIDA ANTARCTICA LIPASE B

Product type

Biocatalyst CALBTA10000 is a recombinant *Candida antarctica* lipase B enzyme expressed in *Pichia pastoris* cells. It is based on covalent immobilization on polyacrylate beads.

Description

Biocatalyst CALBTA10000 is creamish white to white coloured regularly shaped beads with defined particle size distribution. Colour may vary from batch to batch and the colour intensity is not an indication of the product quality.

Advantages

- Chiral selectivity
- Specificity for hydrolysis and synthesis of esters and amides
- Stability in polar and non-polar solvents
- Suitability and recyclability in aqueous and biphasic reactions

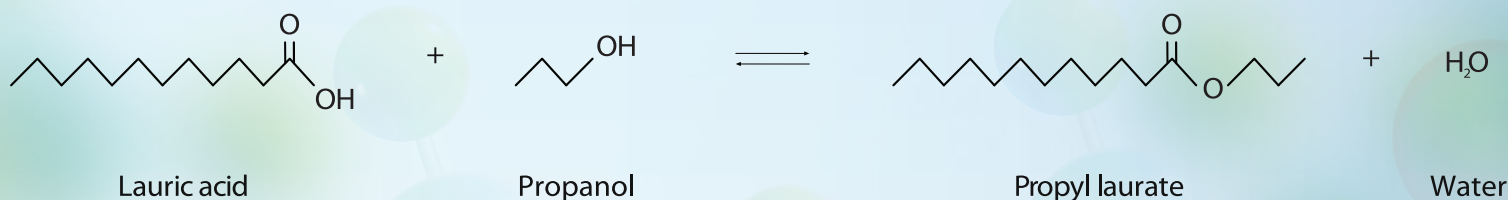
Information

Character	Value
Particle Size	300-500 µm > 95.0%
Dry Weight	> 95%
Enzyme Activity	> 10'000 PLU/g (Propyl laurate synthesis)
PLU definition	One PLU Enzyme unit corresponds to synthesis of 1 µmol propyl laurate per minute per gram of dry enzyme at 60°C from lauric acid and 1- propanol.

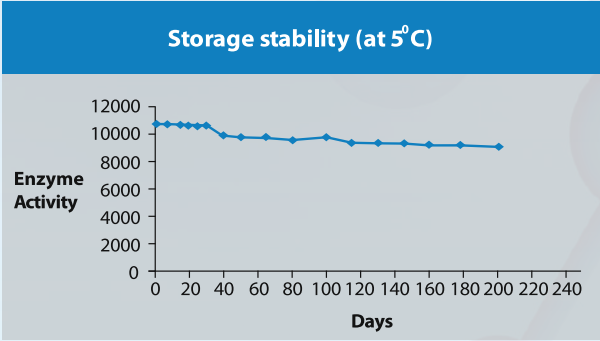
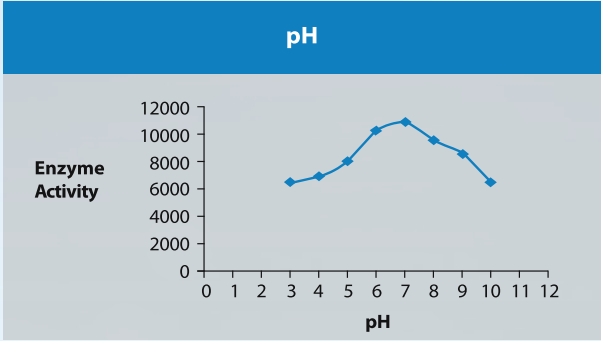
Application

- Versatile applications in APIs, pharmaceuticals, cosmetics, oleo, flavours and fragrance industry.

For PLU activity



Biocatalyst CALBTA10000 Profile



Storage & Product stability

Cool and dry conditions are recommended for storage. The recommended temperature for storing is between 5°C to 8°C. Do not freeze when stored under these conditions, the product will maintain its declared activity for at least 12 months.

Safety

CALBTA10000 is very safe to handle. Avoid raising dust and contact with skin and eyes. Take up spilled dust by mechanical means. Avoid forming aerosols, wash contaminated clothing & ensure sufficient ventilation.

Packing size

- Minimum pack size: 1 kg
- Bulk pack size: 25 kg

Certificates

- Halal
- Kosher



Manufactured by :
Fermenta Biotech Limited
A-1501, Thane One, DIL Complex, Ghodbunder Road,
Majiwade, Thane (West) 400 610, Maharashtra, India

Product type

Biocatalyst TL 15L is recombinant *Thermomyces lanuginosus* lipase enzyme expressed in *Pichia pastoris* cells supplied as formulated enzyme in buffer with permitted stabilizers and preservatives.

Description

Biocatalyst TL 15L is yellowish-green to green colored solution. Color intensity may vary from batch to batch, and intensity is not indicative of product quality.

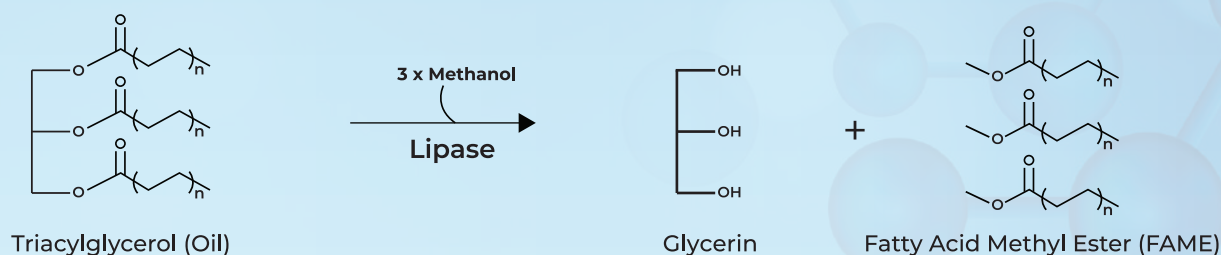
Advantages

- Suitability of use in saturated and unsaturated oils
- Specific for the transesterification and hydrolysis reactions in various oils
- Most suitable for biodiesel application

Application

1. Transesterification

Example: Biodiesel, Ethyl esters, Glycerol esters.

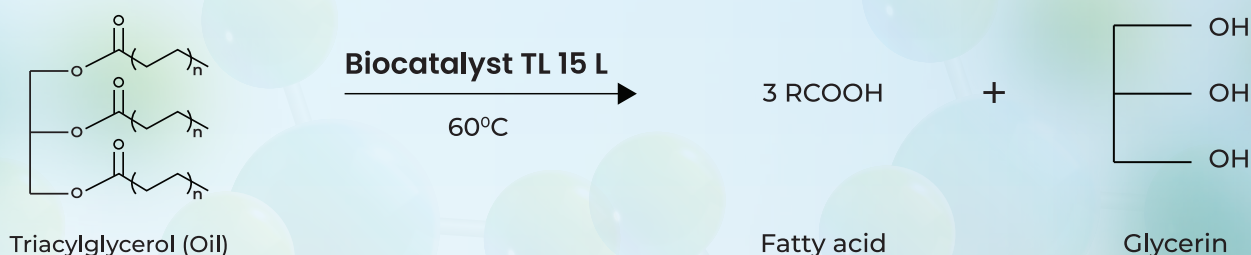


Key advantages of Enzyme use in biodiesel

PARAMETERS	CHEMICAL	ENZYMATIC
Methanol Quantity	40-50%	25-30%
Methanol Recovery	Required	Not Required
Sulphuric acid	Used	Not used
By Product	Soap formation	None
Glycerin coloration	Coloured	Clean
Glycerin purity	Less pure	Pure
Temperature (° C)	80	35-40
Caustic requirement	More	Minimal

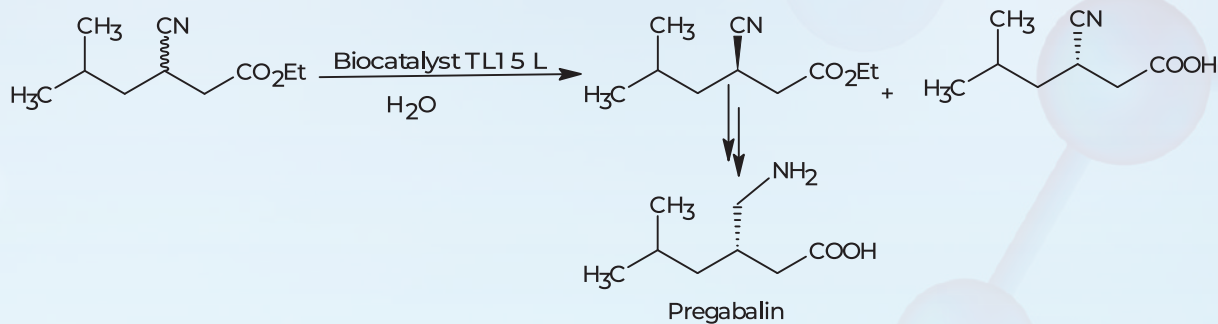
2. Hydrolysis

Reaction chemistry: Hydrolysis of triglycerides in oil to form corresponding fatty acids and glycerin. E.g. Castor oil fatty acids (COFA).



3. API intermediates

E.g. Pregabalin

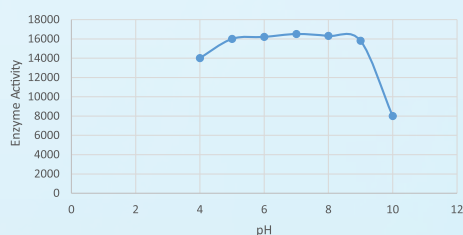


Information

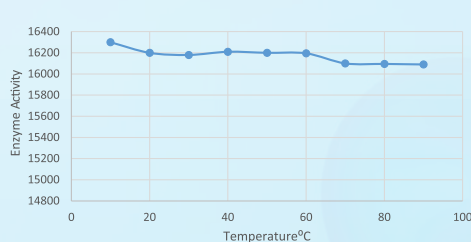
CHARACTER	VALUE
Enzyme Activity	NLT 15000 TBU/mL (Tributyryn hydrolysis)
TBU definition	Amount of enzyme catalyzing the formation of 1 μ mol of butyric acid at 40°C, pH 7.5 at 10% (v/v) Tributyrin concentration per minute per mL enzyme in the milieu of 100 mM sodium phosphate buffer pH 7.5.

Biocatalyst TL 15 L Profile

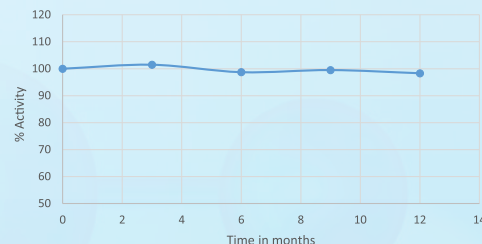
pH profile of Biocatalyst TL 15L



Temperature profile of Biocatalyst TL 15L



Storage Stability of Biocatalyst TL 15L



Storage & Product stability

Cool and dry conditions are recommended for storage. The recommended temperature for storing is between 5°C to 8°C. When stored under these conditions, the product will maintain its declared activity for at least 12 months.

Safety

Biocatalyst TL 15 L is very safe to handle. Avoid raising dust and contact with skin and eyes. Take up spilled dust by mechanical means. Avoid forming aerosols, wash contaminated clothing & ensure sufficient ventilation.

Packing size

- Minimum pack size: 1 kg
- Bulk pack size: 25 kg



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ACCREDITATIONS & CERTIFICATIONS*

ISO
14001:2015



ISO
9001:2015



ISO
45001:2018



*Product / Site Specific



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FBL/BIO/BRO/08/25/01