GreenBiologics

Naturally designed and engineered to deliver the performance that adds value to household and industrial cleaners

Renewable and Bio-based Products for Household, Industrial and Institutional Cleaners

Renewable Products

Green Biologics is a producer of 100% renewable n-butanol and acetone, which we aim to provide to the household, industrial and institutional cleaning industries to enhance the sustainability of these companies' formulated cleaning products. Our renewable products are produced through selective fermentation of C_5 and C_6 sugars by proprietary *Clostridium* biocatalysts and have as much as an 85% lower carbon footprint than petroleum-based alternatives. Our renewable n-butanol and acetone, and their derivatives, are chemically equivalent to the petroleum-based products they replace, with little or no reformulation effort required. Green Biologics is collaborating to chemically synthesise our platform chemicals into higher value derivatives, including ethylene glycol butyl ether (EGBE), a workhorse cleaning solvent in HI&I markets, as well as isopropyl alcohol (IPA), a powerful oil, grease and stain remover.

n-Butanol – Our product name for renewable n-butanol is GB nC4-OL™. It is a four carbon primary alcohol used as an additive and solvent for a variety of household and industrial cleaning applications. n-Butanol is a powerful paint and stain remover, and is an intermediate in the production of butyl glycol ethers and butyl acetate, both used as specialty solvents in HI&I cleaning applications. n-Butanol is a HAPS-compliant solvent, exhibits markedly low toxicity, and is readily biodegradable.

Acetone – Our product name for renewable acetone is GB C3-ONE™. Acetone is a three carbon symmetrical ketone, and is a highly valued cleaning solvent in myriad of applications. Acetone is a VOC-exempt solvent, allowing for use in many applications without the restrictions of other more hazardous volatile chemicals. Acetone is the cleaning solvent of choice for most laboratory and pharmaceutical applications. Common applications include nail polish removers and paint thinners. Additionally, acetone is a platform chemical for other cleaning ingredients such as isopropyl alcohol (IPA) and various ketones (MIBK, MIAK, MAK).

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greeninside® renewable by design

Bio-Based Products

Butyl Acetate – A butyl ester produced from acetic acid and n-butanol, butyl acetate is a solvent with a fruity banana aroma that is used in a variety of household and industrial cleaning formulations. It is a low viscosity, potent solvent with high miscibility with other solvents, and low miscibility with water. Butyl acetate is used as a general cleaning solvent, and as a formulation solvent in car care products. Acetic acid can be produced renewably, making it possible to produce butyl acetate as a 100% renewable bio-based solvent.

Butyl Lactate – A butyl ester produced from lactic acid and n-butanol, butyl lactate is used as an environmentally friendly solvent in dry cleaning applications and laundry applications. It is readily miscible with a wide range of organic solvents, and partly miscible with water. Lactic acid is a well-known carboxylic acid that occurs naturally in the human body and can be produced through industrial fermentation. Use of renewable n-butanol with a natural lactic acid would result in a 100 % bio-based product.

Ethylene glycol butyl ether – Renewable n-butanol can be utilised to produce a range of both propyl and ethyl glycol ethers. The most common polymeric composition is ethylene glycol mono butyl ether, or EGBE. It is safe for use in formulating glass and tile cleaners, waxes, rust removers and metal polishes. EGBE is considered an industry workhorse in household and industrial cleaners. It provides coalescing benefits in water based waxes and polishes. Use of renewable n-butanol to make EGBE would result in a product that is 62.7 % bio-based.

Isopropyl Alcohol – A common three carbon alcohol generally known as rubbing alcohol, IPA is utilised extensively as a degreaser and cleaner in automotive applications such as brake cleaners and windshield de-icers. It is also common in electronic applications such as laptop, keyboard and mouse cleaners. It is miscible in water and many solvents, and evaporates quickly with minimal residual impact. It can be esterified with acetic acid to produce isopropyl acetate, a common cleaning agent. Hydrogenating renewable acetone to IPA would result in a product that is 100% bio-based.

Butyl Stearate – A valuable chemical used in industrial cleaning applications and household cleaners, common consumer product end uses for this ester include detergents and car care products such as leather cleaners and conditioners. Stearic acid is an 18-carbon chain carboxylic acid that is commonly found in animal and vegetable fats and oils. While much more common in animal than vegetable fats, it is a large component of cocoa and shea butter (28–45%). Esterifying a natural stearic acid with renewable n-butanol would produce a butyl stearate that is 100% bio-based.

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