

VertecBio Gold Graffiti Remover

Product Selection and Description

VertecBio™ Gold is a corn and soybean derived solvent used to remove spray paint and ink from all types of surfaces. It is a light gold liquid with low volatility that is rinsed away with water. For the BEES system, 3.8 L (1 gal) of VertecBio™ Gold is studied.

Flow Diagram

The flow diagram below shows the major elements of the production of this product, as it is currently modeled for BEES.

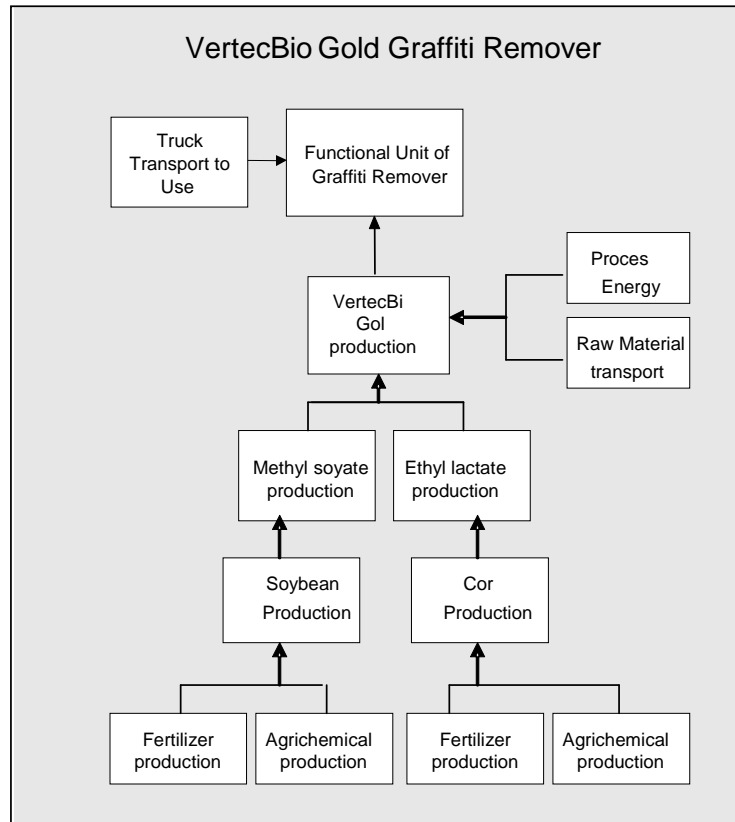


Figure 1: VertecBio™ Gold System Boundaries

Raw Materials

VertecBio™ Gold is primarily made up of the materials shown in the Table below.

Table 1: VertecBio™ Gold Graffiti Remover Constituents

<i>Constituent</i>	<i>Mass Fraction (%)</i>
Ethyl lactate	50
Methyl soyate	50

Data for the soybean-based input, methyl soyate, is based on soybean production data from the U.S. LCI Database. Data for both the production of soybean oil and the esterification process used to produce methyl soyate comes from a National Renewable Energy Laboratory LCA study on biodiesel use in an urban bus.¹ Information on ethyl lactate comes from the manufacturer,² elements of the U.S. LCI Database, a report by Lawrence Berkeley National Laboratory on corn wet milling,³ and U.S. EPA AP-42 emissions factors.⁴

Manufacturing

Energy Requirements and Emissions. VertecBio™ Gold production involves mixing the components in batches. No heating of the components is required. Energy is used for pumping raw materials into a 3.78 m³ (1 000 gal) vessel, mixing the components, and pumping the product out of the vessel. Actual energy requirements are not available; the pumps are assumed to require 1.5 kW (2 hp) for a duration of 1 h and the mixer is assumed to require 15 kW (20 hp) for a duration of 1 h, based on conversations with production facility personnel. Total energy use per 3.785 m³ (1 000 gal) batch is calculated to be 59.1 MJ (16.4 kWh), or 0.06 MJ (0.02 kWh) per gal.

Transportation. The transportation distance for shipping the raw materials to the manufacturing plant by diesel truck is assumed to be 402 km (250 mi). Diesel trucking burdens are modeled based on the U.S. LCI Database.

Transportation

Product transport is assumed to cover 1 175 km (730 mi) by diesel truck, which is modeled based on the U.S. LCI Database.

Use

One gal of VertecBio™ Gold weighs 3.56 kg (7.85 lb), and it is fully biodegradable. No data on effluents from rinsing the product are available.

End of Life

No end-of-life modeling is required since the product is fully consumed during the use phase.

References

Life Cycle Data

National Renewable Energy Laboratory (NREL): *U.S. Life-Cycle Inventory Database*. 2005. Golden, CO.

Found at: <http://www.nrel.gov/lci/database>.

PRé Consultants: *SimaPro 6.0 LCA Software*. 2005. The Netherlands.

Sheehan, J. et al., *Life Cycle Inventory of Biodiesel and Petroleum Diesel for Use in an Urban Bus*,

NREL/SR-580-24089 (Washington, DC: U.S. Department of Agriculture and U.S. Department of Energy,

¹ Sheehan, J. et al., NREL/SR-580-24089 (Washington, DC: US Department of Agriculture and US Department of Energy, May 1998).

² Phone conversation with Rathin Datta, Vertec Biosolvents, September 20, 2004.

³ Galitsky, C., Worrell, E., and Ruth, M., LBNL-52307 (Ernest Orlando Lawrence Berkeley National Laboratory, July 2003).

⁴ U.S. Environmental Protection Agency, "Corn Wet Milling," Volume I: Section 9.9.7, *AP-42: Compilation of Air Pollutant Emission Factors* (Washington, DC: US Environmental Protection Agency, January 1995). Found at: <http://www.epa.gov/ttn/chief/ap42/ch09/final/c9s09-7.pdf>

May 1998).

Galitsky, C., Worrell, E., and Ruth, M., Energy efficiency improvement and cost saving opportunities for the corn wet milling industry, LBNL-52307 (Ernest Orlando Lawrence Berkeley National Laboratory, July 2003).

U.S. Environmental Protection Agency, "Corn Wet Milling," Volume I: Section 9.9.7, *AP-42: Compilation of Air Pollutant Emission Factors*, (Washington, DC: U.S. Environmental Protection Agency, January 1995). Found at: <http://www.epa.gov/ttn/chief/ap42/ch09/final/c9s09-7.pdf>.

Industry Contacts

Vertec Biosolvents, Inc. (September 2004)