A **proven solution** for **extended release**

Eastman **BioSustane**™ SAIB NF
pharmaceutical excipient

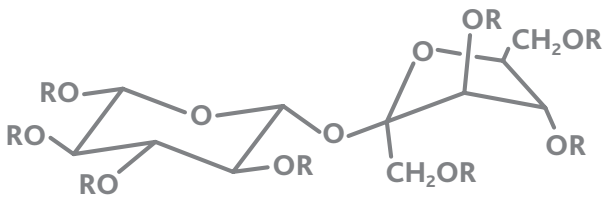
EASTMAN

Pharmaceutical formulators know that selecting the right excipient is a key decision in the drug development process.

We make that decision easy with Eastman BioSustane™ SAIB NF, a versatile solution that meets the challenges of poor solubility, extended release, depot forming, and abuse deterrence. This innovative excipient has multiple functionalities and is already used in an FDA-approved drug formulation.

BioSustane is a safe, naturally derived product made in a Current Good Manufacturing Practices (CGMP) facility by Eastman, a company known for its high-quality standards.

Chemical structure



BioSustane (sucrose acetate isobutyrate)
R = acetyl, isobutyl, or H
CAS 126-13-6

Product features

BioSustane is sucrose acetate isobutyrate, an esterified sugar derivative with the following attributes:

- Odorless, colorless, viscous liquid
- Viscosity can be greatly reduced with commonly used pharmaceutical solvents.
- Does not crystallize and remains amorphous at ambient temperature
- Nonpolymeric; will not coagulate or precipitate when in contact with aqueous body fluids
- Soluble in organic solvents and dispersible in water with aid of organic solvents and surfactants
- Has bioadhesive and mucoadhesive properties
- Thermally, hydrolytically, and oxidatively stable

Regulatory status

BioSustane SAIB NF is manufactured in a dedicated facility in accordance with CGMP provided for by the International Pharmaceutical Excipient Council. It has a published United States Pharmacopeia National Formulary (USP–NF) monograph and is considered generally recognized as safe (GRAS) by the U.S. FDA. Drug master file 19694 is on file with the FDA.

Marketed products

BioSustane is currently marketed in several formulations, including:

- Posimir—an injectable bupivacaine drug approved by the FDA in February 2021*
- Methydur Sustained Release Capsules—a drug formulation for the treatment of attention-deficit/hyperactivity disorder (ADHD), approved for marketing in Taiwan in September 2018
- SucroMate™—an FDA-approved animal health product

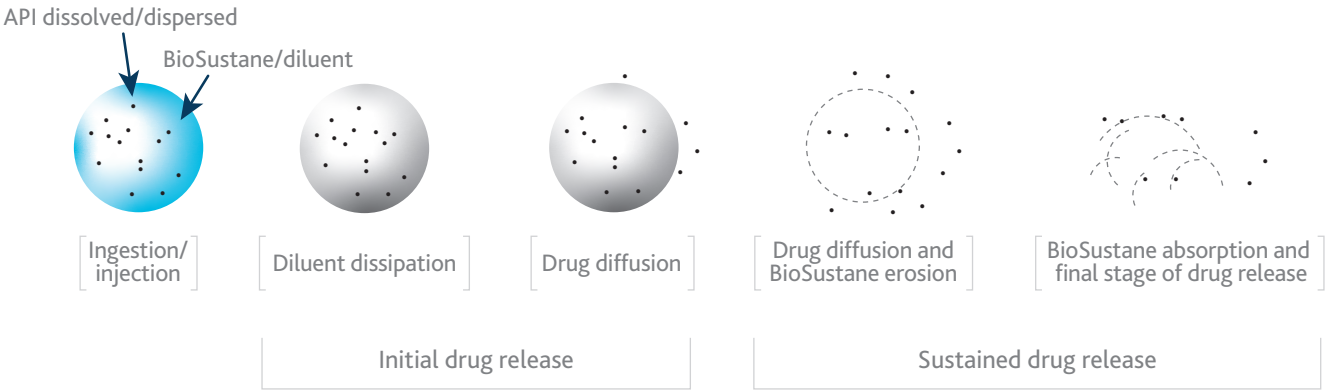
BioSustane enables extended-release formulations.

The highly lipophilic nature of BioSustane makes it an excellent choice for both oral extended-release and injectable depot formulation. Whether administered orally or injected, when exposed to an aqueous environment, BioSustane forms a gel-like matrix depot with the active ingredient trapped inside. The active ingredient is released slowly over time.

Mechanism of extended release of API from BioSustane

Concept: On injection of a solution containing BioSustane, solvent, API, and optional additives, the small amount of solvent diffuses into the surrounding tissue or interstitial fluid and leaves a highly viscous depot from which there is delayed release of the active ingredient. The rate of breakdown of the depot can be slowed through the addition of an additive such as a biodegradable polymer.

Mechanism of release of API from BioSustane depot



The BioSustane advantage for injectables

- Simple formulation—as few as three ingredients
- No complex processing— for example, no microspheres
- Controllable release rate—72 hours to 6 weeks
- Strong solvent and API compatibility

Eastman does not market an injectable grade of BioSustane.

**POSIMIR is a trademark of Innocoll Pharmaceuticals Limited in the U.S. and a trademark of DURECT Corporation outside the U.S.*

BioSustane in FDA-approved injectable drug Posimir

- **Posimir**
  Posimir is a bupivacaine solution indicated in adults for administration into the subacromial space under direct arthroscopic visualization to produce postsurgical analgesia for up to 72 hours following arthroscopic subacromial decompression.
- **BioSustane in formulation**
  BioSustane acts as a depot-former matrix that provides stable release of bupivacaine for 72 hours.
- **Marketing status**
  Posimir is approved for marketing in the U.S. and, subsequently, licensed to Innocoll Biotherapeutics for commercialization.

Possible Posimir formulation

Ingredient	Patent claims	Actual injection solution*
Bupivacaine (free base)	5–20 wt%	132 mg/mL
BioSustane	25–75 wt%	725 mg/mL
Benzyl alcohol	10–55 wt%	220 mg/mL

Local anesthetic for pain control for up to 72 hours
**Maximum bupivacaine dosage = 660 mg, 5 mL solution, single injection*
Sources: https://pdfpiw.uspto.gov/, Posimir.com, Innocoll.com, FDA, and Eastman research

BioSustane in FDA-approved veterinary drug SucroMate

- **SucroMate**
  SucroMate Equine (deslorelin acetate) is a sterile, synthetic gonadotropin-releasing hormone (GnRH) analog suspension. SucroMate Equine is a sustained-release formulation that forms an in situ gel after intramuscular injection.
- **BioSustane in formulation**
  BioSustane acts as a depot former that provides a stable release of deslorelin acetate for about 48 hours.
- **Marketing status**
  SucroMate is approved for marketing in the U.S.

SucroMate formulation

Ingredient	Amount
Deslorelin acetate	1.8 mg
BioSustane SAIB	700 mg
Propylene carbonate	300 mg

Sources: https://thornbioscience.com/veterinary-products/, https://www.orbit.com/#PatentDocumentPage

Depots in development

Exploratory ophthalmic formulation with 42-day release

Ingredient	Patent claims	Specific example
Sirolimus	1–5 wt%	3 wt%
BioSustane	0.5–5 wt%	1 wt%
Benzyl benzoate	35–45 wt%	43.6 wt%
Ethanol	3–10 wt%	4.8 wt%
Polyethylene glycol	40–50 wt%	45 wt%
Vitamin E	0.5–2 wt%	1 wt%

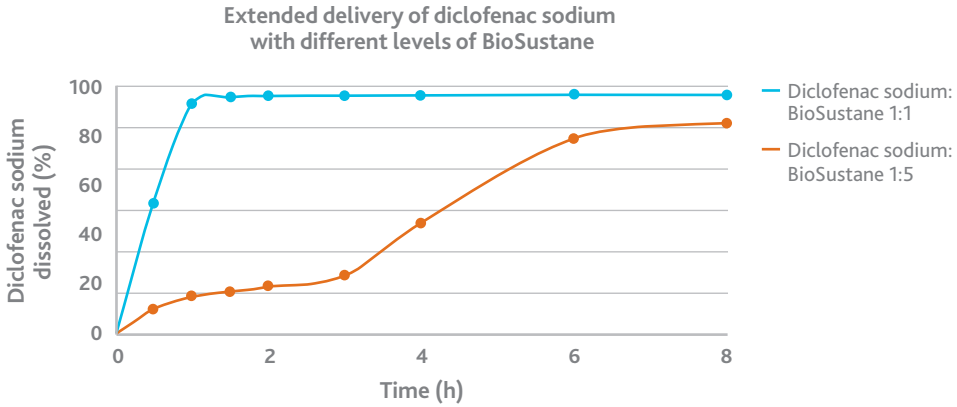
Source: U.S. patent 20200383957

Exploratory veterinary formulation with 21-day release

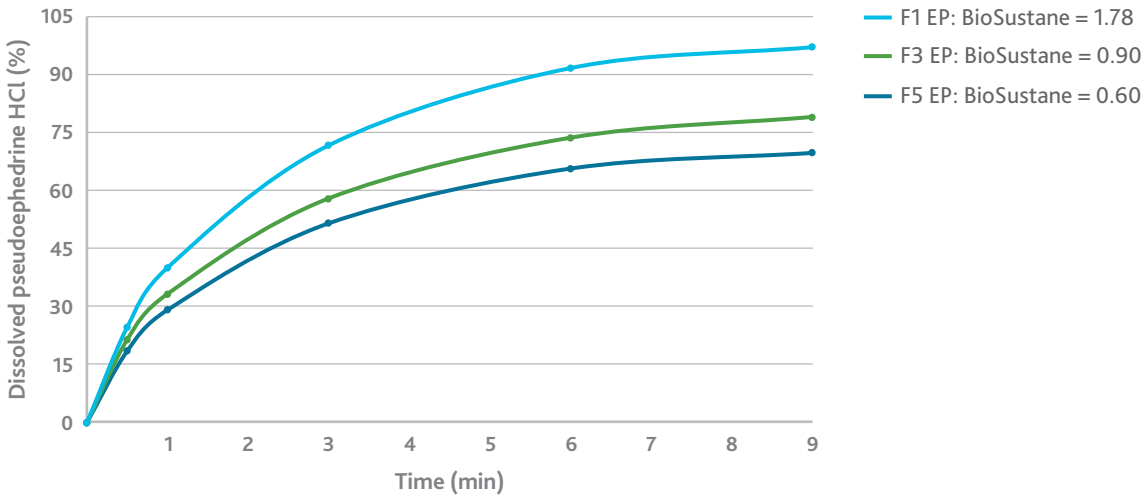
Ingredient	Patent claims	Specific example
Pharma API	Not given	15 wt% (florfenicol)
Triglyceride carrier	5–70 wt%	44 wt% (triacetin)
BioSustane	5–70 wt%	37 wt%
Solvent	30–60 wt%	4 wt% (ethanol)

Source: U.S. patent 20200368263

Extended-release oral formulations demonstrate how the release can be tuned with varying amounts of BioSustane in the formulation.



Extended delivery of pseudoephedrine hydrochloride matrix tablets based on PEO (49.8%–64%) and BioSustane (7.1%–21.3%).



Summary

BioSustane is an excipient with multiple functionalities that help drug formulators find new ways to solve formulation challenges. To learn more about how BioSustane can support your formulation needs or speak with an expert, visit **eastman.com/pharma**.

Notes

EASTMAN

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