A **proven solution** for **poor solubility**

Eastman **BioSustane**™ SAIB NF
pharmaceutical excipient

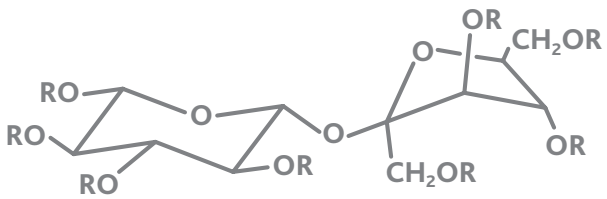
EASTMAN

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 as 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 FDA. Drug master file 19694 is on file with the U.S. FDA.

Marketed products

posimir® (bupivacaine solution for infiltration use)

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 for amorphous solid dispersions

Highly hydrophobic BioSustane dissolves many active pharmaceutical ingredients (APIs) with poor water solubility and enables the development of new formulations by preventing recrystallization and improving bioavailability. BioSustane does not need hot-melt extrusion or spray drying for formulating dispersions.

BioSustane dissolving typical poorly water-soluble APIs

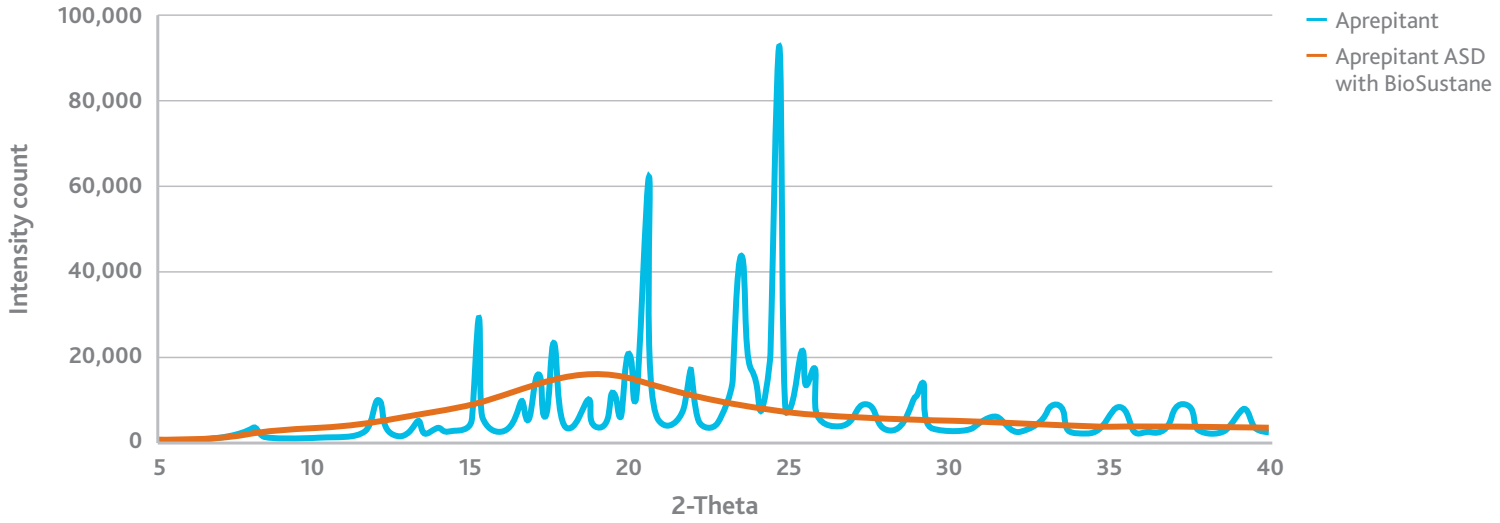
Solubility improved by three orders of magnitude with BioSustane compared to water.

API BCS Class II and IV	Water solubility (µg/g)	BioSustane solubility (µg/g)
Rifaximin	7.1	$36.36 \pm 0.93 \times 10^3$
Aripiprazole	7.7	$511.6 \pm 29.6 \times 10^3$
Dolutegravir	3.176	$1.7 \pm 0.4 \times 10^3$
Cyclosporine	4.0	$239 \pm 12.6 \times 10^3$
Tacrolimus	4.02	$143.1 \pm 28.3 \times 10^3$
Sirolimus	1.73	$1.92 \pm 0.04 \times 10^3$
Aprepitant	3–7	$0.39 \pm 0.04 \times 10^3$
Carbamazepine	152	$76.54 \pm 4.04 \times 10^3$

APIs were dissolved at 150°C up to saturation (left-side bottles), filtered, and allowed to cool to 40°C, 75% RH (right-side bottles).

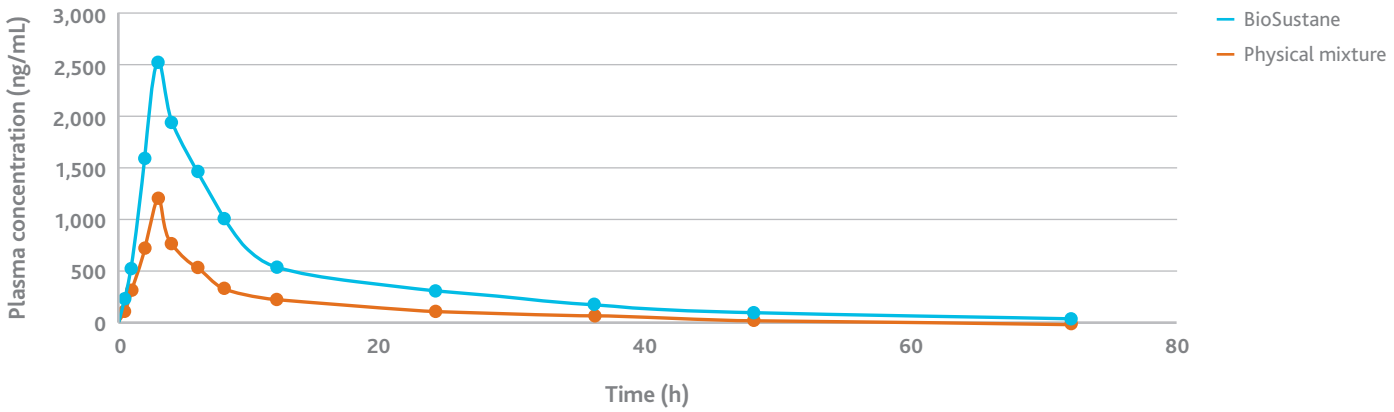
BioSustane solubilizes and prevents recrystallization of the poorly water-soluble API.

X-ray crystallography shows no peaks for the BioSustane/aprepitant solution, indicating no recrystallization occurs after solubilization.



Bioavailability for BioSustane/aprepitant tablets

An in vivo canine study was performed comparing an optimized BioSustane/aprepitant oral formulation to a control formulation that did not contain BioSustane. The formulation containing BioSustane showed approximately twice the bioavailability of the control without BioSustane.

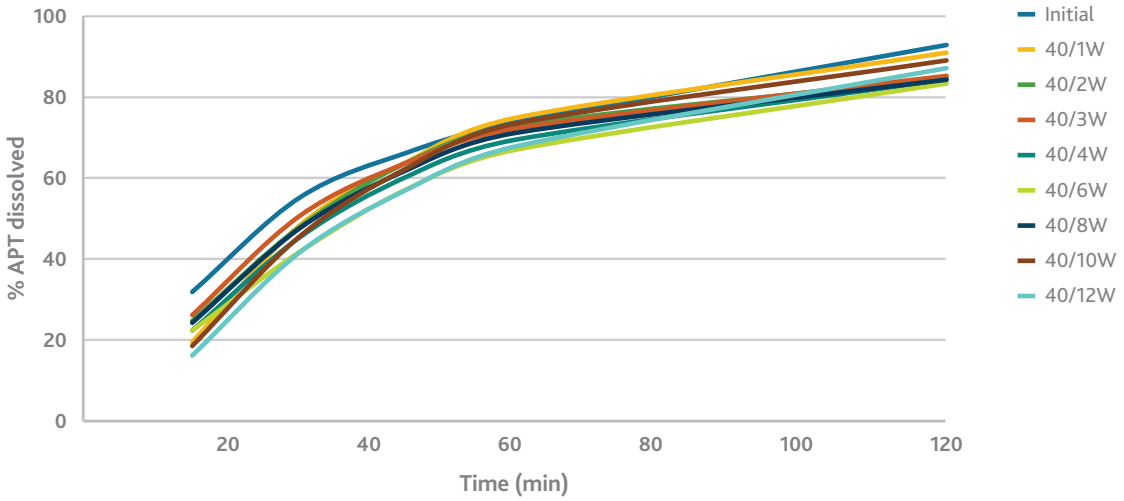


Pharmacokinetics parameter	C_{max} (ng/mL)	T_{max} (h)	AUC_{0-t} (ng·h/mL)	$AUC_{0-\infty}$ (ng·h/mL)	$T_{1/2}$ (h)	Kel (1/h)
BioSustane	2,522.9 ± 390.6	3	25,688.4 ± 2692.9	26,589.6 ± 2624.4	13.2 ± 1.6	0.053 ± 0.007
Physical mixture*	1,214.2 ± 189.6	3	9,784.9 ± 722.1	10,499.4 ± 437.9	14.1 ± 3.3	0.05 ± 0.01

**The physical mixture does not contain BioSustane.*

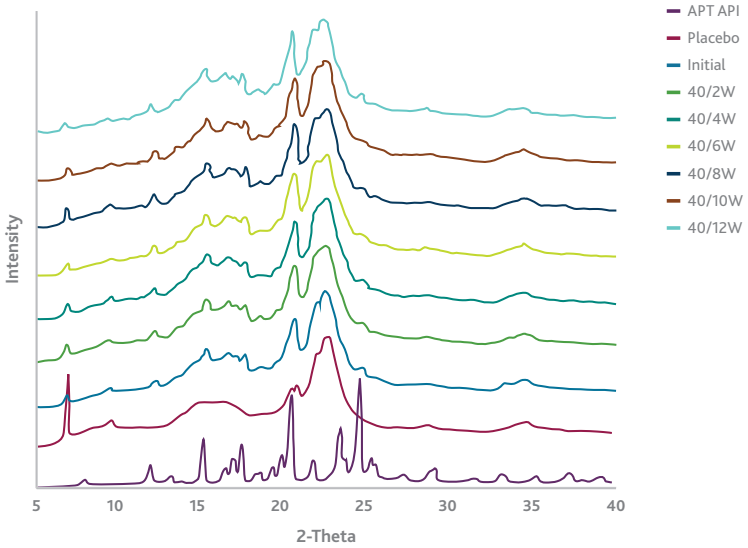
Dissolution stability curves for BioSustane/aprepitant tablets

The same oral formulation of aprepitant in BioSustane was prepared and tested for dissolution characteristics. Initial results showed an excess of 90% release at two hours. Accelerated stability studies (three months 40°C/75% RH) show dissolution remains constant as the tablets age.



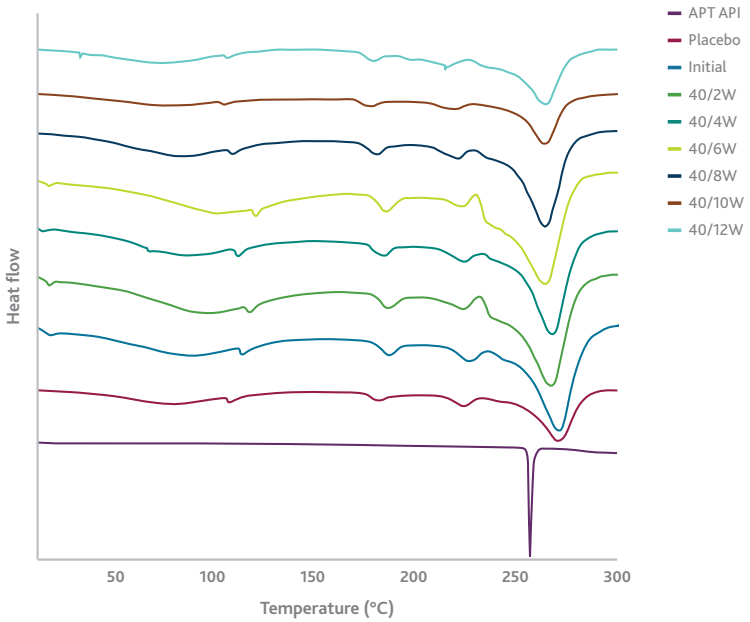
X-ray crystallography stability for BioSustane/aprepitant tablets

Both X-ray crystallography and differential scanning calorimetry of these tablets indicate that the aprepitant is in the amorphous state at the time of compression and remains in the amorphous state as the tablets age. The X-ray scans are for aprepitant alone, placebo, and final formulation during storage stability studies. The lack of fine structure in the formulated samples indicates a lack of recrystallization.



Differential scanning calorimetry (DSC) stability studies for BioSustane/aprepitant tablets

The DSC for aprepitant shows a sharp melting point indicating a high degree of crystallinity. The placebo and formulated samples display no melting point behavior.



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**.

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The results of **insight**™

Eastman Corporate Headquarters
P.O. Box 431
Kingsport, TN 37662-5280 U.S.A.

U.S.A. and Canada, 800-EASTMAN (800-327-8626)
Other locations, +(1) 423-229-2000

www.eastman.com/locations

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