

# STRUCTURE<sup>®</sup> ZEA Starch

## STRUCTURE<sup>®</sup> ZEA Starch INCI: Hydroxypropyl Starch Phosphate

### Rheology/Aesthetics Modifier and Emulsion Stabilizer

#### INTRODUCTION

STRUCTURE<sup>®</sup> ZEA starch, a waxy maize starch-based rheology modifier, offers excellent viscosity build in reconstitutable powdered products such as hair bleaches and dyes. Additionally, it is a good choice for emulsion products where improved physical stability and rheology aesthetics are desired from a naturally-derived ingredient.

One of the most unique attributes of the STRUCTURE ZEA starch is its ability to readily disperse in cold water. Supplied as a pre-swelled agglomerated starch powder, it will very rapidly dissolve when diluted. This makes it ideally suited for powdered bleaches and dyes, where instant dispersability is required and where lumping and mixing time should be minimized. Just as importantly, STRUCTURE ZEA starch will significantly boost the viscosity of powdered bleaches and dyes when they are mixed with water or peroxide solutions.

In emulsion products such as skin creams and hair rinses, STRUCTURE ZEA starch can aid in emulsion stabilization, aesthetics enhancement, and rheology modification. An emulsion containing STRUCTURE ZEA starch will look and feel creamier and richer. And because STRUCTURE ZEA starch is so readily cold water dispersible, no separate mixing tanks are needed and manufacturing efficiencies can be greatly enhanced.

#### APPLICATION AREAS

All natural creams, Lotions, Powdered bleach, Powdered hair dyes

#### FEATURES / BENEFITS

Feature	Benefit
Cold water-swellable	Outstanding dispersability in cold water; improved efficiencies can be achieved in manufacturing and consumer end-use.
Nonionic	Can be used with cationic conditioning agents. Is also compatible with personal care ingredients common to powdered bleaches, dyes, and emulsions. Tolerates broad pH environments.
Modified waxy maize starch	Naturally-derived. Biodegradable. Improves emulsion stability. Allows emulsions to feel richer, creamier, and more substantive.
Large particle size	Very low dusting compared to typical powdered ingredients.
Salt tolerant	Remains stable even in the presence of high electrolytes levels.

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## SUGGESTED USE LEVELS, AS SUPPLIED

Reconstitutable powders:	1%, recommended concentrations depend on dilution factor
Emulsion stability and aesthetics:	1% to 3%, significant viscosity effects at concentrations >3%

## FORMULATION GUIDELINES

### Ease of Use

Because STRUCTURE ZEA starch is an agglomerated, pre-gelatinized starch, it will dissolve in cold water almost instantly allowing for flexibility in manufacturing and formulation. The mixing of powdered dyes and bleaches with aqueous components is also made much easier for the end user. One can observe the effects of agglomeration (see below) by measuring the dissolution time the of STRUCTURE ZEA starch against a non-agglomerated version of the same modified waxy maize starch base.

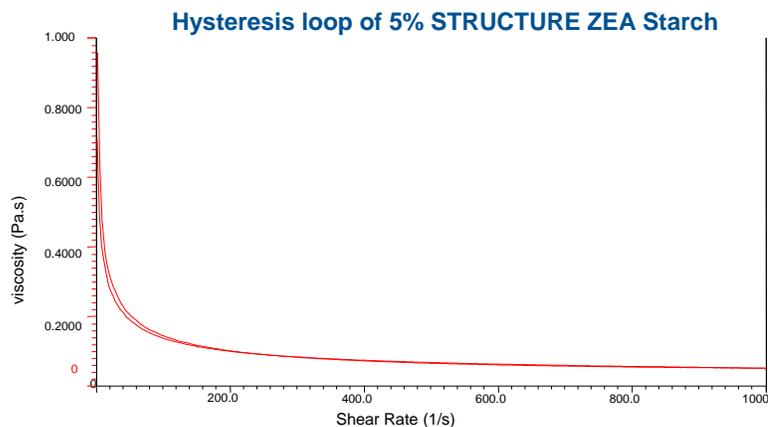
Starch	Dissolution Time (sec)
STRUCTURE ZEA starch	173
Non-agglomerated STRUCTURE ZEA starch	606

### Rheology

STRUCTURE ZEA starch is extremely shear-thinning, with rapid viscosity recovery. This is an ideal property for hair and skin treatment products where good workability is desired, yet the formulation must set up instantly when shear is removed.

Figure 1 shows a hysteresis loop of a 5% STRUCTURE ZEA starch solution. The near overlap of the increasing and decreasing shear sweeps demonstrates the pseudoplastic nature of this rheology modifier. A gap between the two curves would have indicated a longer viscosity recovery time, leaving a formulation prone to dripping when shear is removed.

Figure 1



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### PERFORMANCE PROPERTIES

#### In Reconstitutable Hair Treatment Products

STRUCTURE ZEA starch is ideally suited for powdered hair bleaches and dyes. Even at low concentrations, STRUCTURE ZEA starch can significantly build viscosity. It will not contribute to dusting and it will greatly improve a powder's ability to dissolve quickly and easily in cold water. STRUCTURE ZEA starch is compatible with cationic ingredients, salts, powdered perborates, and other ingredients common to powdered dyes and bleaches.

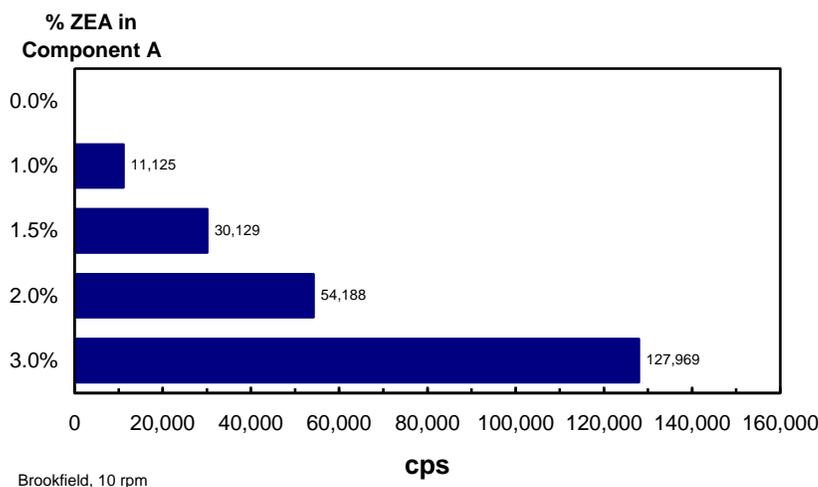
Formulation 1 attached is a powdered hair bleach which contains 1.5% STRUCTURE ZEA starch. Figure 2 shows how the viscosity of the hair bleach mixture can be tailored by changing the concentration of STRUCTURE ZEA starch in the dry powder component.

This example demonstrates the polymer's ability to thicken efficiently; however first-hand evaluations are required in order to fully comprehend the ease of use, reduced dusting, and creamy rheology that STRUCTURE ZEA starch brings to the formulation.

Formulation 1: Thickened Hair Bleaching System		
Component	Ingredients	Grams in formulation
A	Ammonium Persulfate	1.50
	Potassium Hydrogen Tartrate	1.50
	Sodium Carbonate	1.50
	Sodium Lauryl Sulfate	0.50
	STRUCTURE <sup>®</sup> ZEA	0.75
	Magnesium Hydroxide	22.13
	Aluminum Hydroxide	22.12
	Total	50.00
B	Cosmetic Grade Hydrogen Peroxide, 50%	12.00
	Distilled Water	88.00
	Total	100.00

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Figure 2



### In Emulsions

The STRUCTURE ZEA starch has demonstrated unique performance attributes in such products as conditioning hair cream rinses and skin creams and lotions. The starch can improve an emulsion's aesthetics and stability, aid in hair conditioning, help stabilize emulsions, and may improve the viscosity of the formulation. Formulation 2 is a rinse-off treatment product, which takes advantage of the polymer's thickening, aesthetics enhancement, and stabilizing properties. This formulation also uses the DynamX<sup>®</sup> styling polymer to provide curl defining and anti-frizz benefits.

#### Formulation 2: Beyond Defining Anti-Frizz Crème Rinse 13915-11

	Ingredient	INCI Designation	%W/W
Phase A	DI Water	Water (aqua)	89.24
	STRUCTURE ZEA	Hydroxypropyl Starch Phosphate	2.00
	DynamX polymer (28% solids)	Polyurethane-14 (and) AMP-Acrylates Copolymer	1.00
	Dehyquart A	Cetrimonium Chloride	3.76
Phase B	Lanette O	Cetearyl Alcohol	2.20
	Brij 58	Ceteth-20	0.30
Phase C	DC 2-1352 Emulsion	Dimethicone (and) Laureth-23 (and) C12- 15 Pareth-3	1.00
	Glydant Plus Liquid	DMDM Hydantoin (and) Iodopropynyl Butylcarbamate	0.50
TOTAL			100.00

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### STORAGE AND HANDLING

The STRUCTURE ZEA starch should be stored in a cool, dry location away from heat, sparks or fire. Good industrial hygiene practices should be followed when working with this polymer.

Please read the MSDS before working with this or any other chemical.

### HEALTH AND SAFETY

A health and safety summary for STRUCTURE ZEA is available on request.

It is non GM (genetically modified).

The suitability of the final formulations should be confirmed in all respect by appropriate evaluation. The marketer is advised to evaluate the final formulation with regard to performance and health safety.

All STRUCTURE Series thickeners are available worldwide. STRUCTURE ZEA starch is distributed through National Starch Personal Care subsidiaries and agents on a global basis.

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