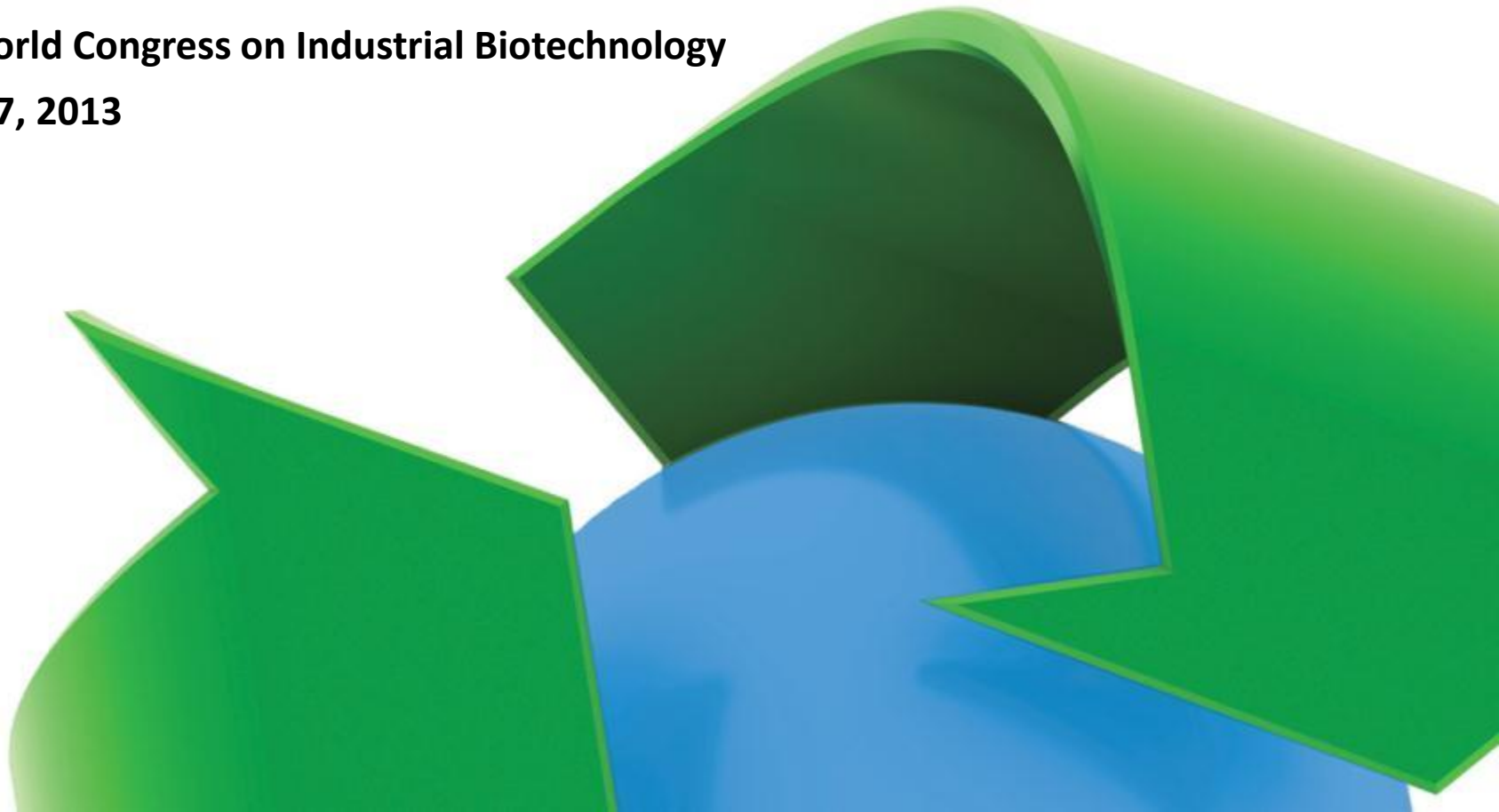




## **Polymers for Better Living™**

**BIO World Congress on Industrial Biotechnology**

**June 17, 2013**





**Polymers for Better Living™**

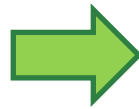
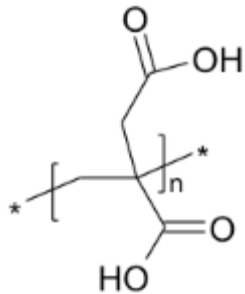
Itaconix Corporation  
is the world leader in  
polymers from itaconic acid

We produce polymers for  
everyday applications that  
achieve two essential  
objectives - performance and  
sustainability

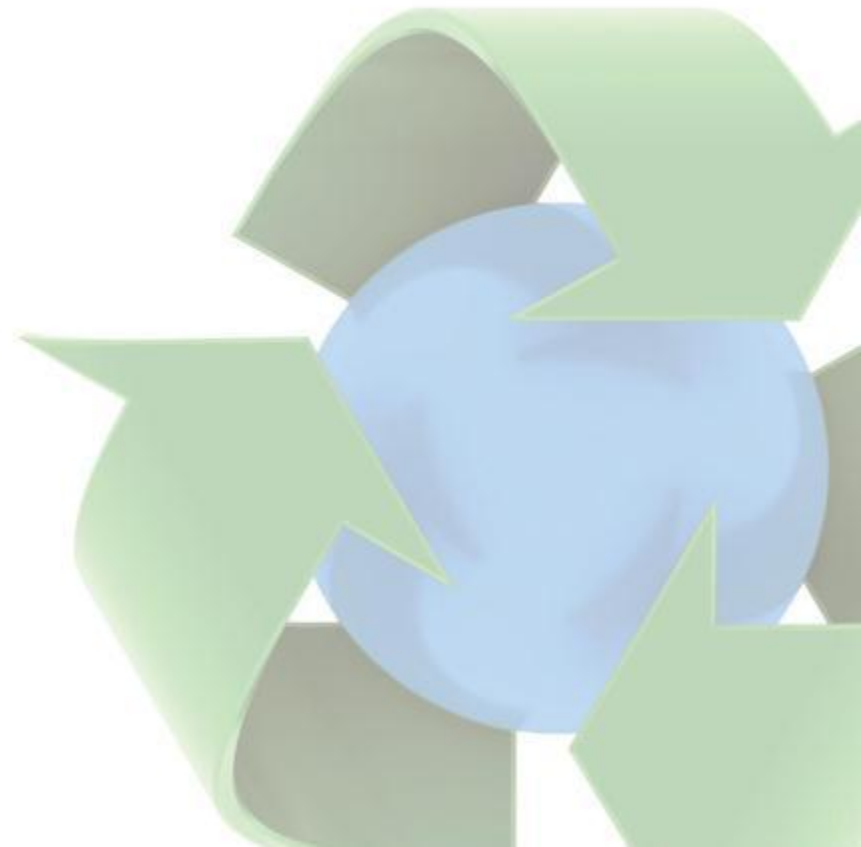


# Itaconix nix

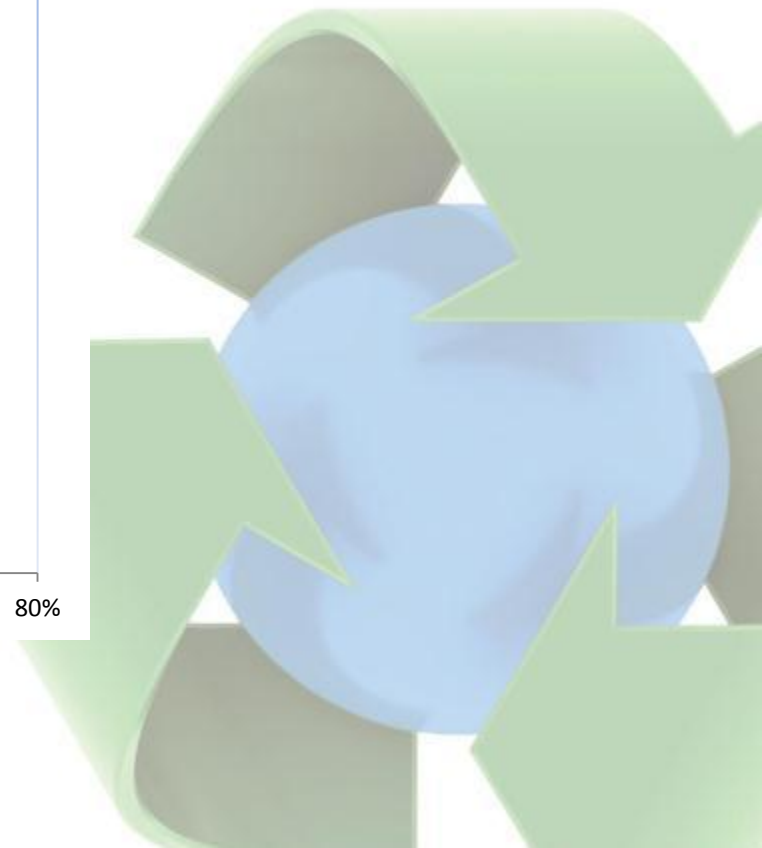
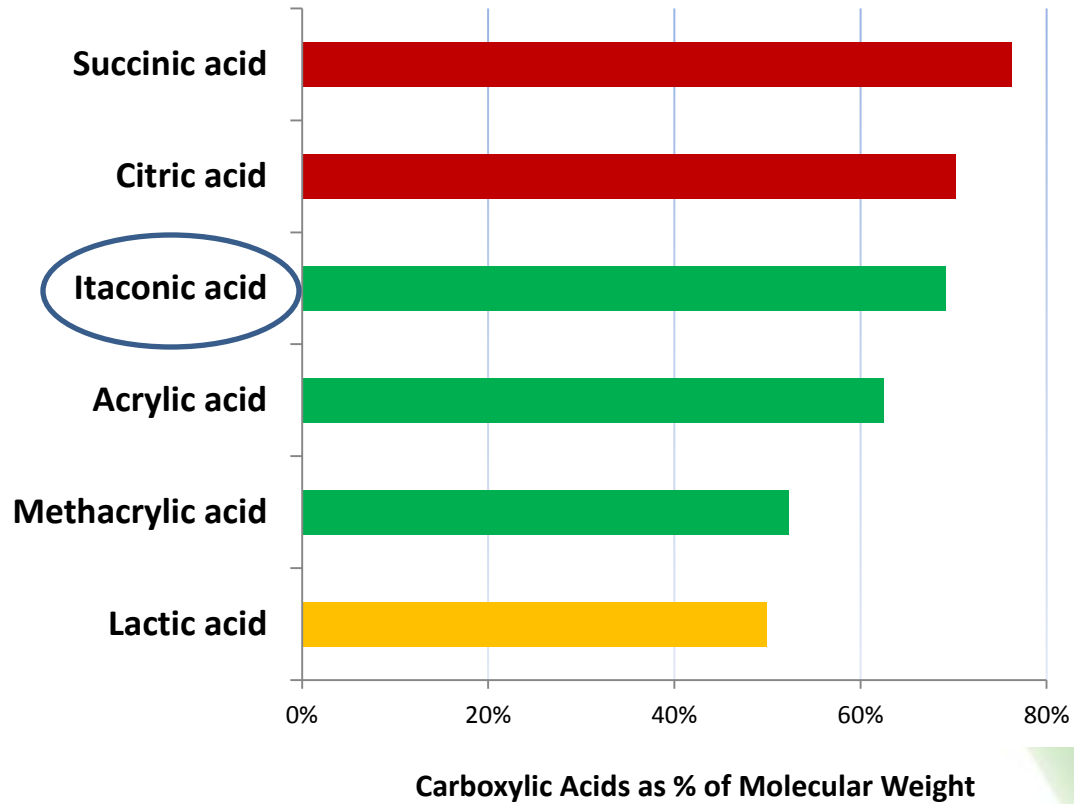
## Itaconix Polymers - 100% Sustainable Carbon



Itaconix makes polymers from itaconic acid that are 100% sustainable - all of the carbon comes from renewable resources.



## Carboxylic Acid Density



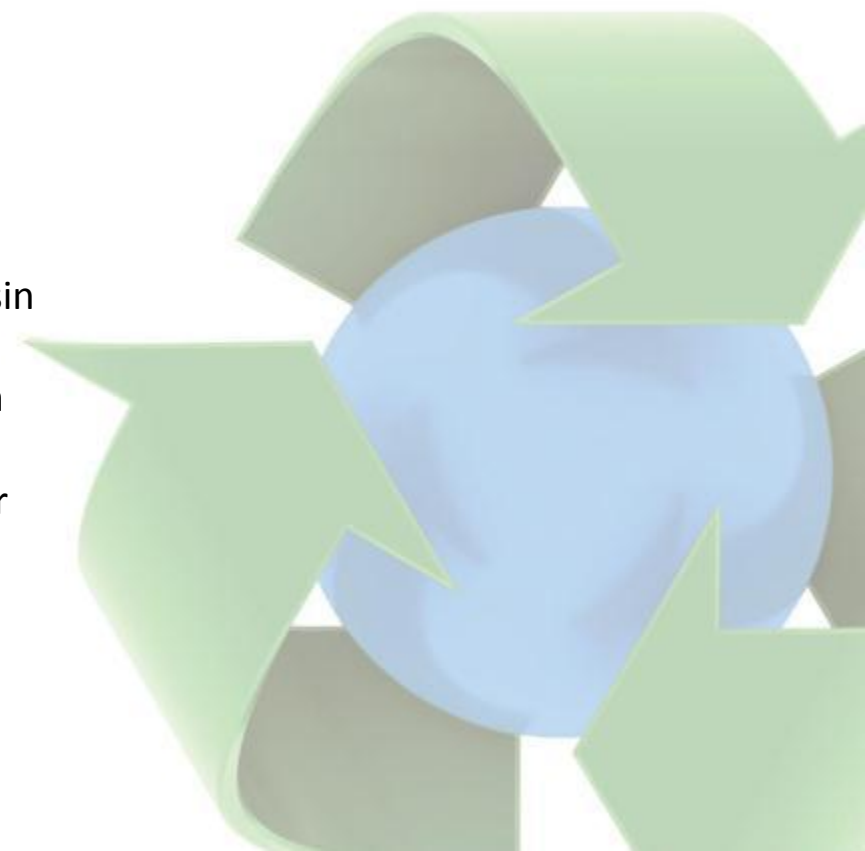


## Polymers from Itaconic Acid – Novel Chemistry, Unique Functionality

### Chemical Property

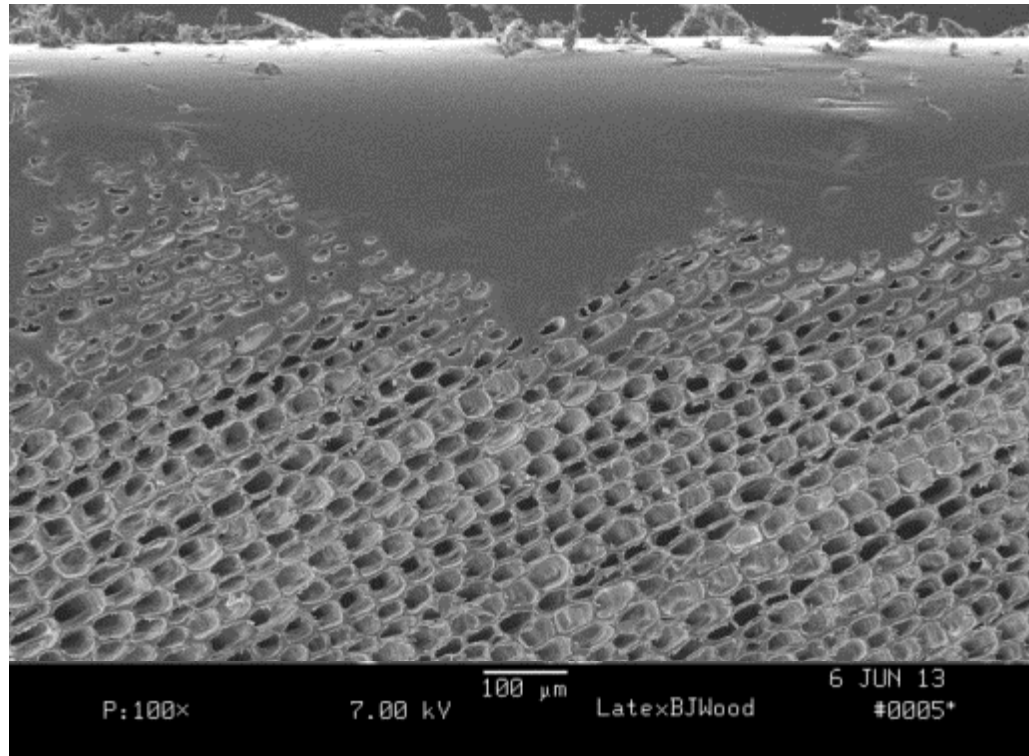
### Functionality

- |                                 |                     |
|---------------------------------|---------------------|
| 1. Metal ion binding            | Chelation           |
| 2. Cationic surface repulsion   | Dispersion          |
| 3. Polar surface binding        | Binder              |
| 4. Hydrophilic surface adhesion | Water soluble resin |
| 5. Hydrophobic surface adhesion | Waterborne resin    |
| 6. Polymer chain entanglement   | Viscosity modifier  |
| 7. Electrolyte dilution         | Absorbent           |



## Barrier Properties for Wood

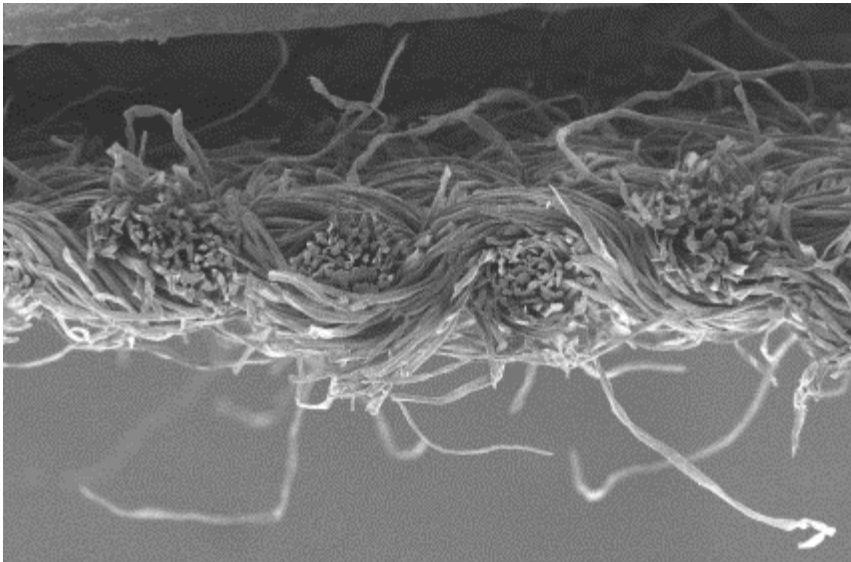
### Itaconix Latex on Wood



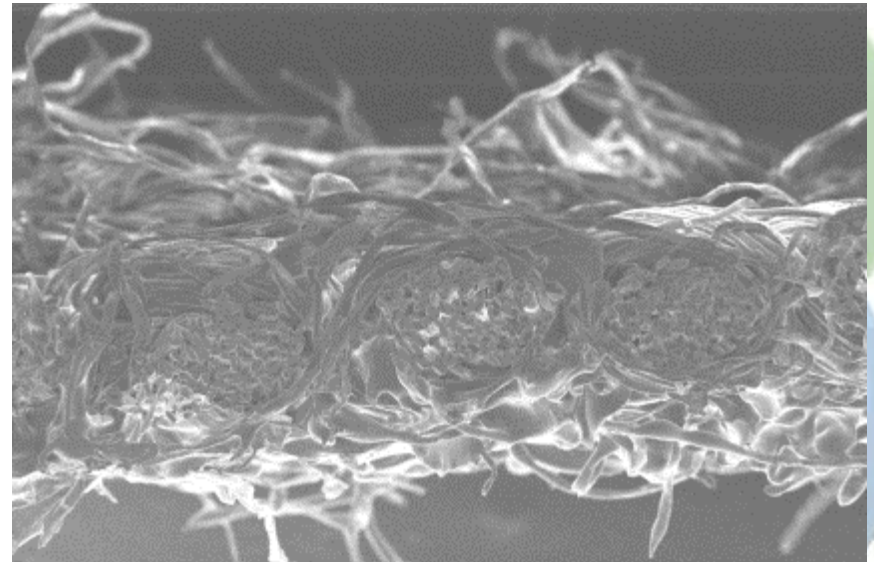


## Barrier Properties for Textiles

**Untreated Cotton**

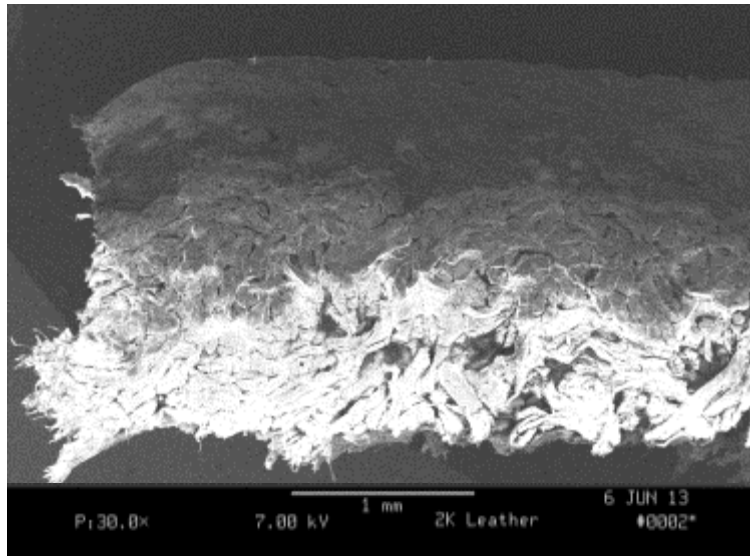


**Cotton with Itaconix Latex**

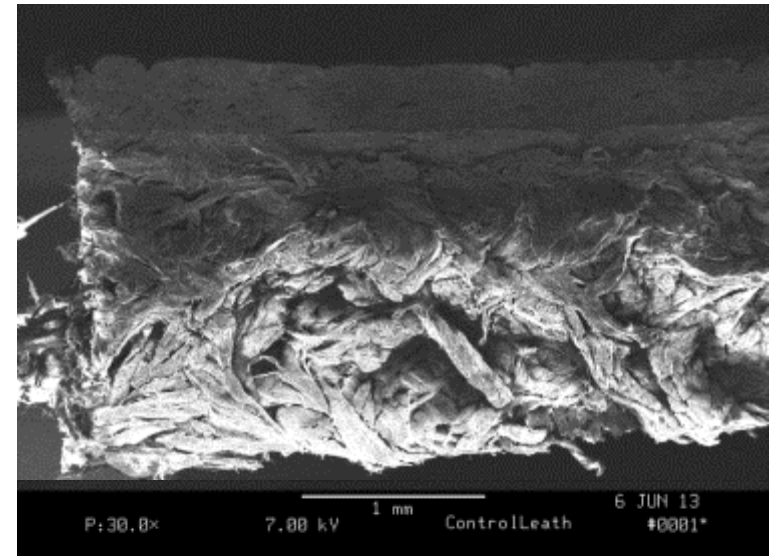


## Strengthening Leather with Itaconix DSP™ in Retanning

Leather with Itaconix DPS™



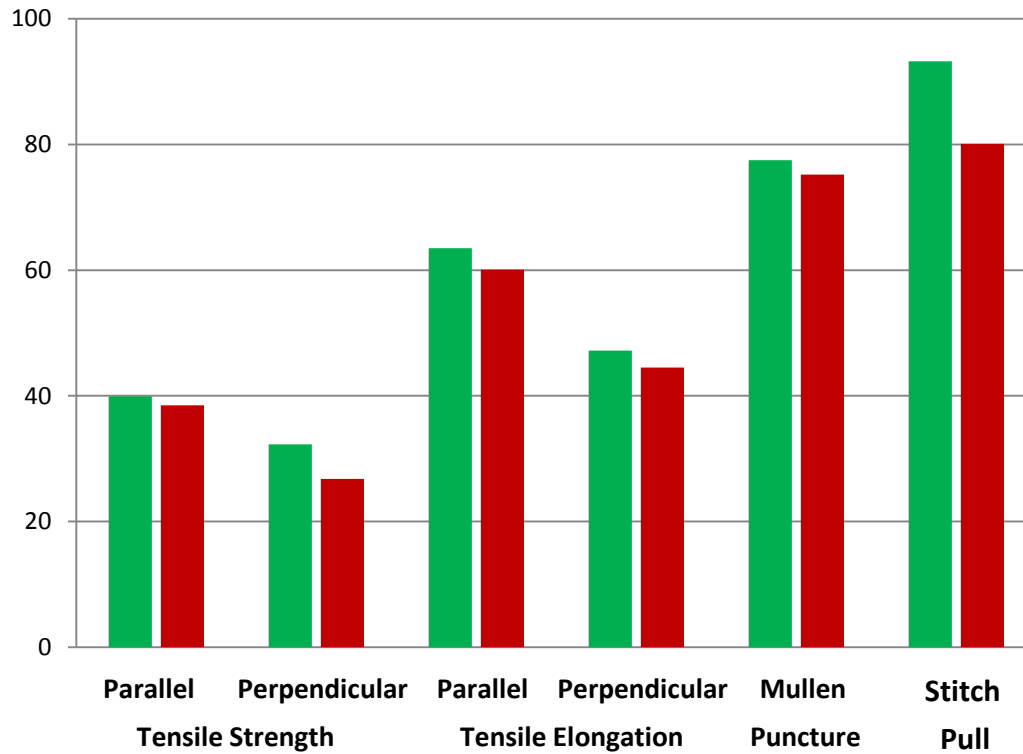
Leather with Polyacrylate







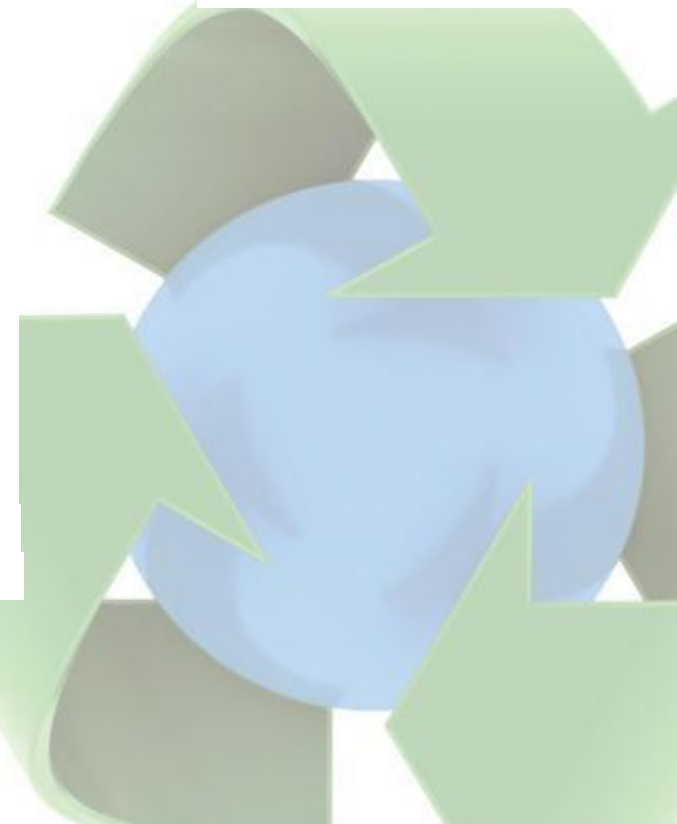
## Leather Retanned with Itaconix DSP™

psi



 Itaconix DSP™  
 Polyacrylate

Source: Chemtan analyses



# Itac nix

**Detergents**



**Textiles & Leather**



**Paper**



**Coatings**



## Polymers for Better Living™

**Oil & Minerals**



**Personal Care**



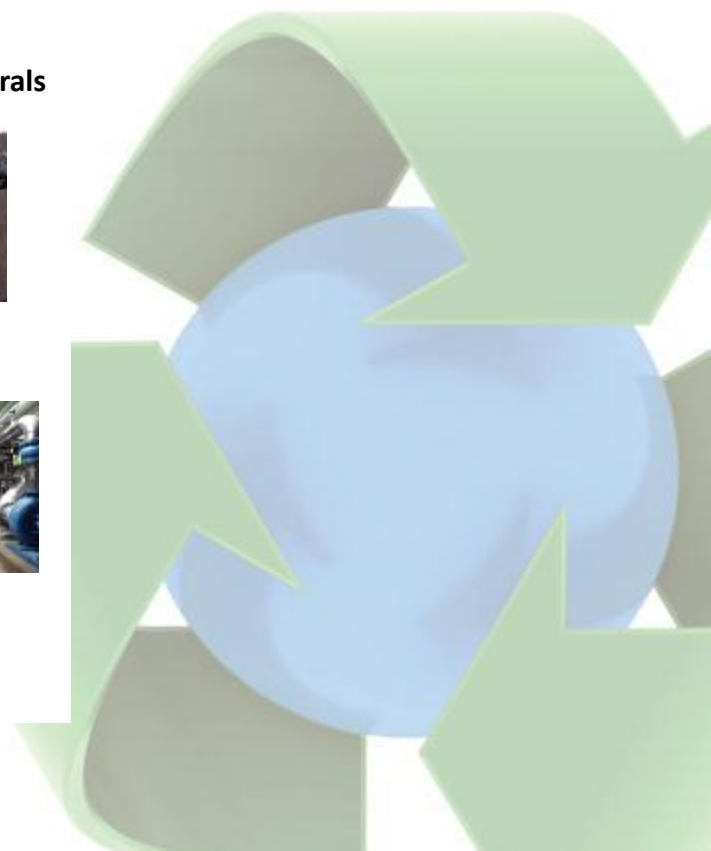
**Agriculture**



**Hygiene**



**Water**





### What Were the Top Emerging Technology Companies in 2012?

Technology scouting firm Lux Research releases its top 10 companies profiled in 2012, featuring leaders in bio-based materials, 3D-printing, photovoltaics, drug delivery, energy efficiency and more

9. [Itaconix](#) – Positive – Bio-based Materials and Chemicals

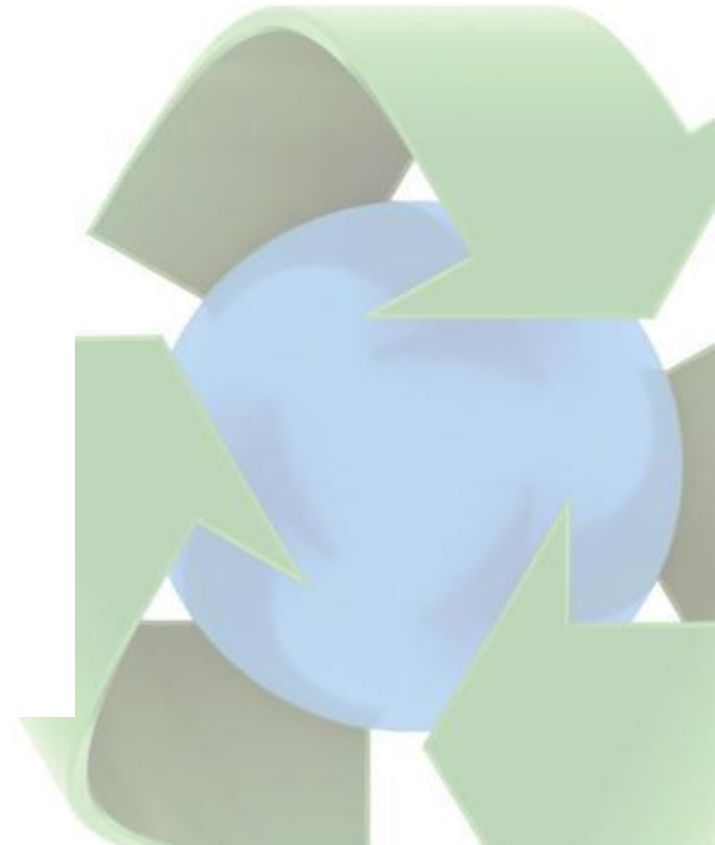
With a low-capex, low-opex process expanding to 5,000 MT/year to produce itaconic acid polymers for chemical intermediates, binders, and super-absorbents, Itaconix is one of the few bio-based chemical companies we expect to run in the black in 2013.

# Itac nix

## Detergents



**Polymers for Better Living™**



# Itaconix®

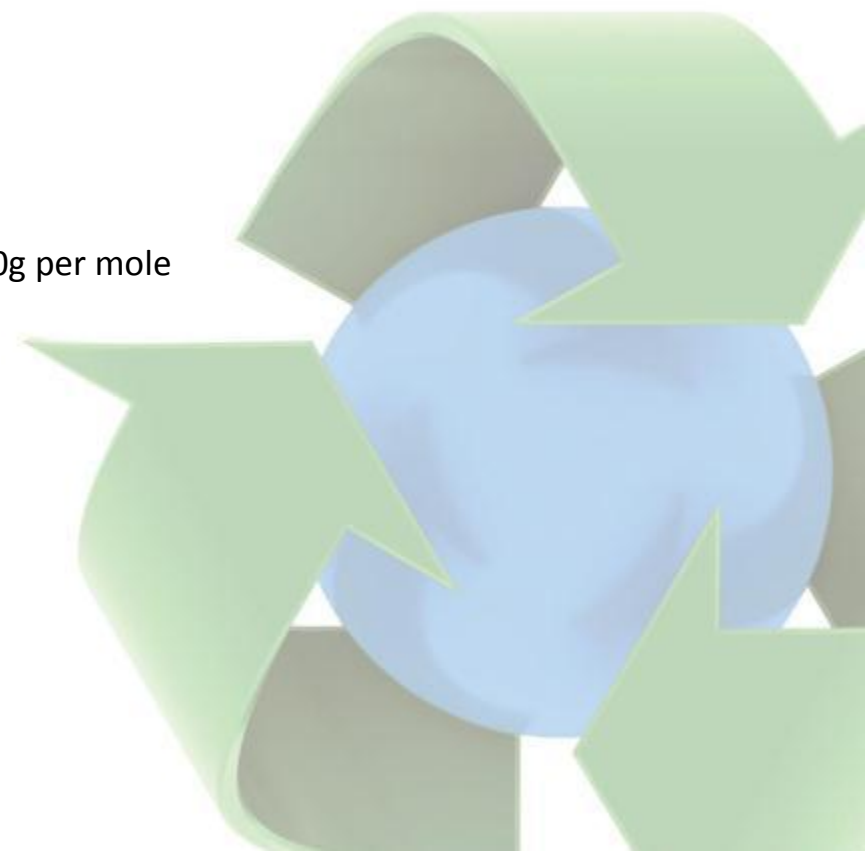


## Itaconix® Dispersant DSP™

Low molecular weight linear polyitaconic acid partially neutralized with sodium salt

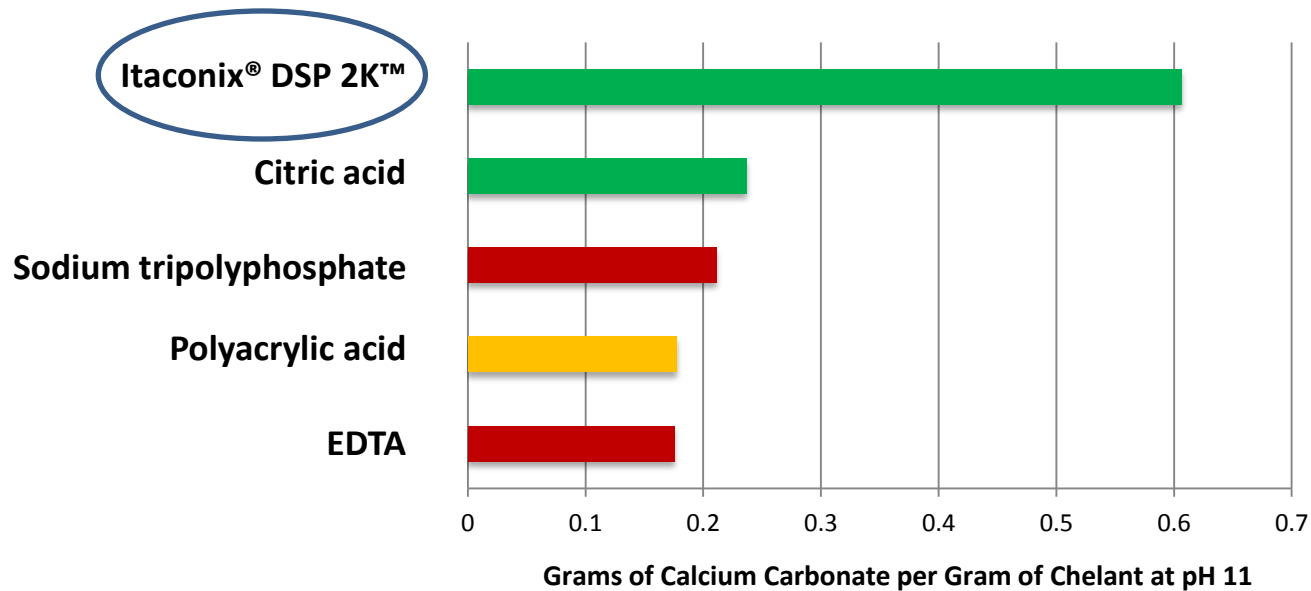


- Free-flowing granulate
- 100% water soluble
- Off-white color, no odor
- Number average molecular weight of 1500g to 15000g per mole
- Excellent capacity for binding metal ions
- 100% bio-based
- Readily biodegradable

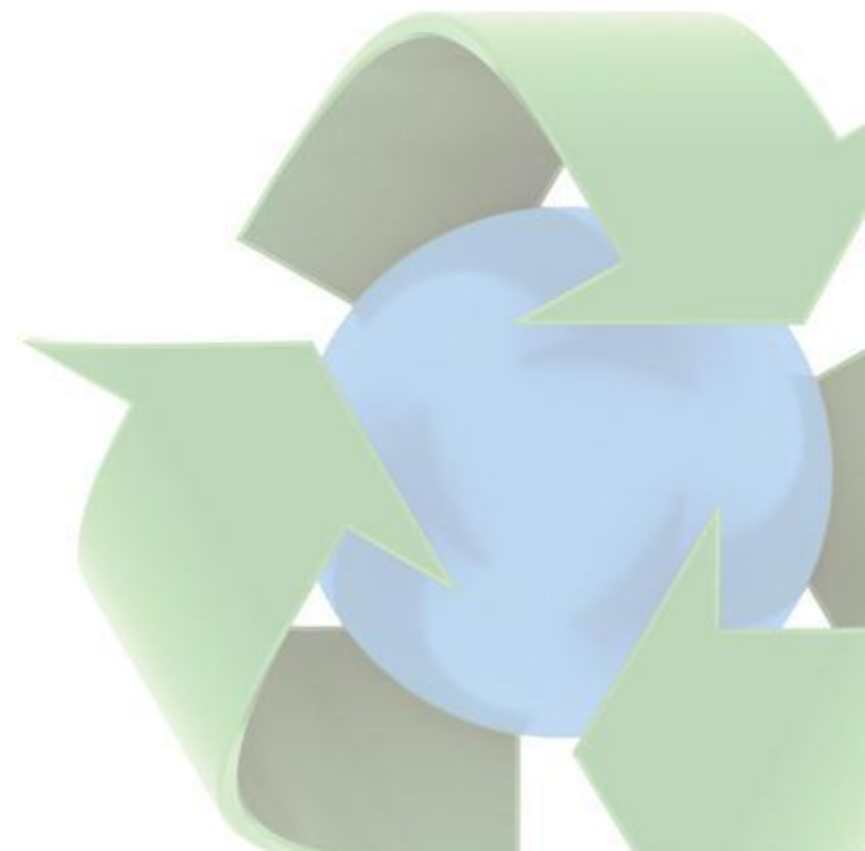
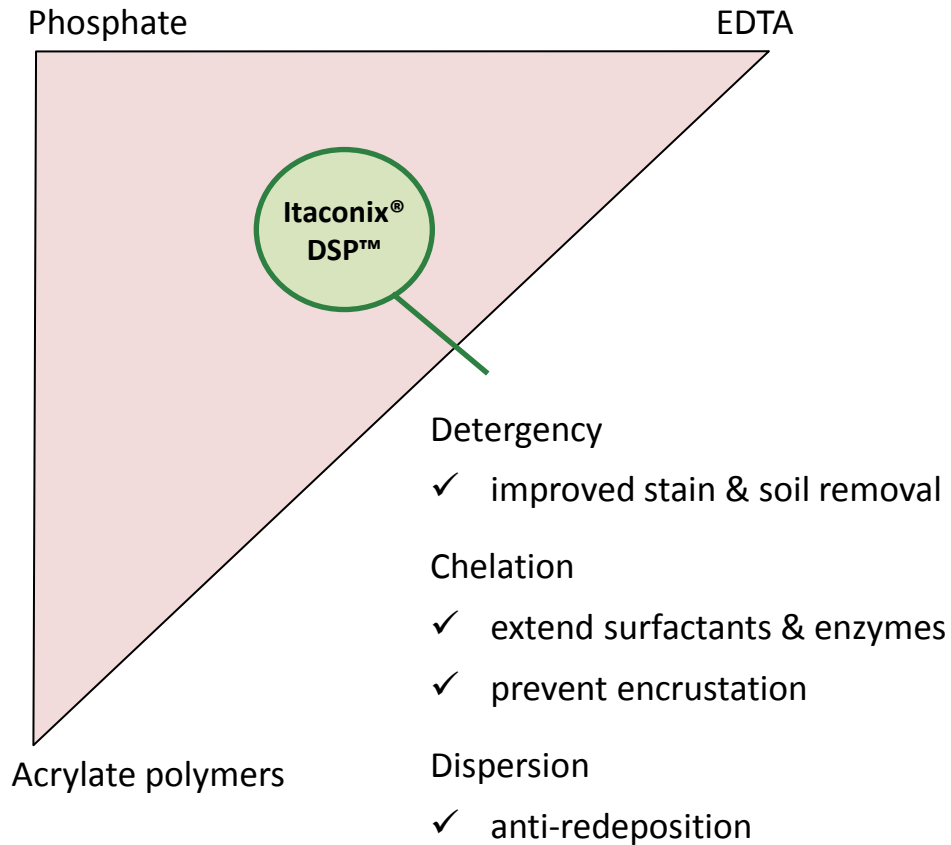




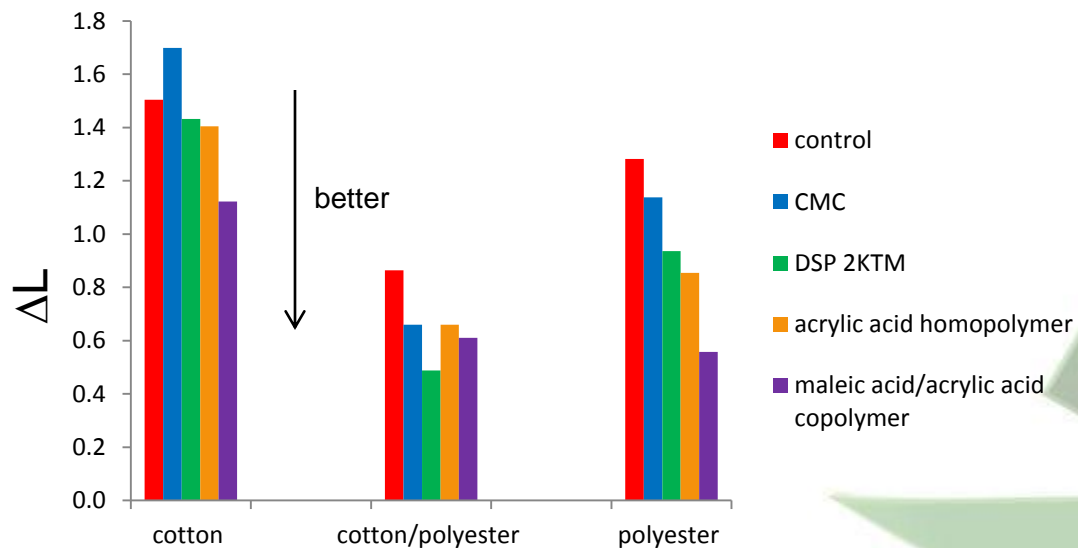
## Excellent Binding Capacity vs. Leading Detergent Builders



# Improving Detergent Performance with Unique Functionality

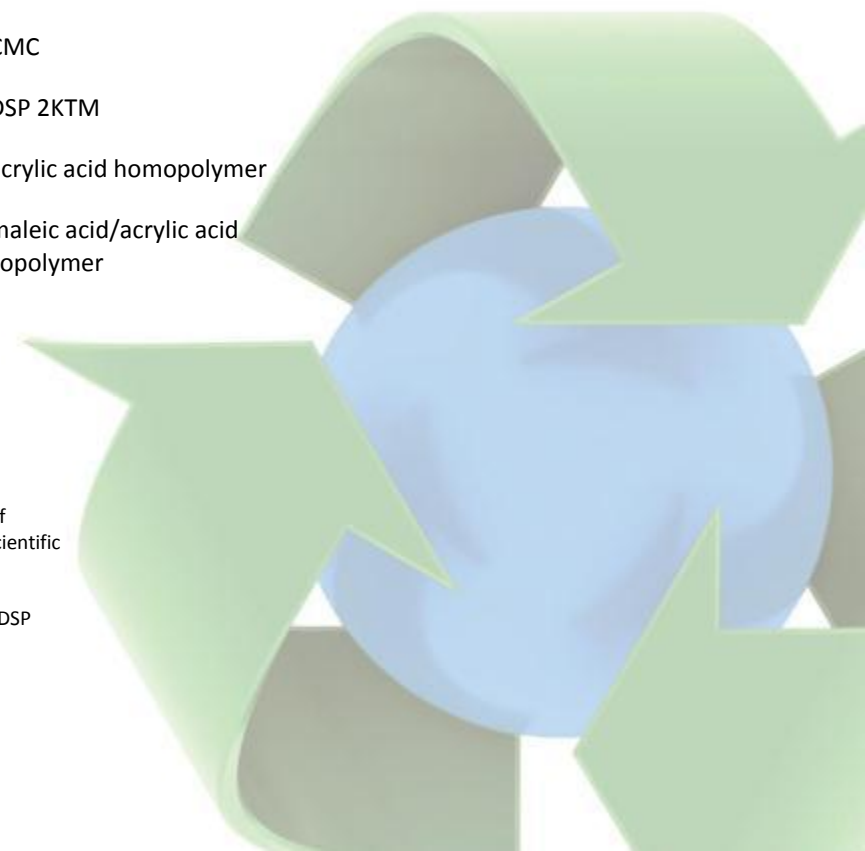


## Anti-Redeposition Properties of Itaconix® DSP 2K™



**Test method:**

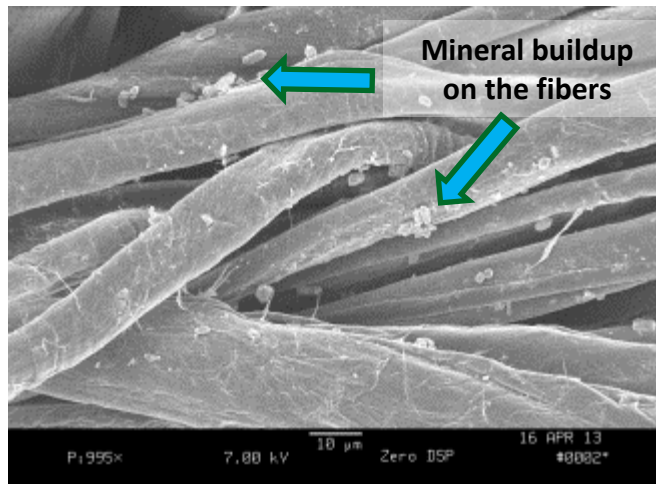
30° C wash temperature; 150ppm water hardness; Wash time: 10 min; Rinse time: 5 min; # of cycles: 10; Fabric load: Cotton #400, Cotton Polyester # 7435 WRL and Polyester # 777 from Scientific Services S/D Inc. (15 swatches);  
 Soil load: 1g Dust Sebum Emulsion + 0.9g Clay Slurry; Detergent concentration: 0.15 wt%;  
 Detergent composition (wt%): sodium carbonate - 82, sodium metasilicate pentahydrate - 3, DSP 2K™/polymeric dispersing agent - 2, nonionic surfactant - 3, anionic surfactant - 8;  
 L\* obtained with HunterLab spectrophotometer



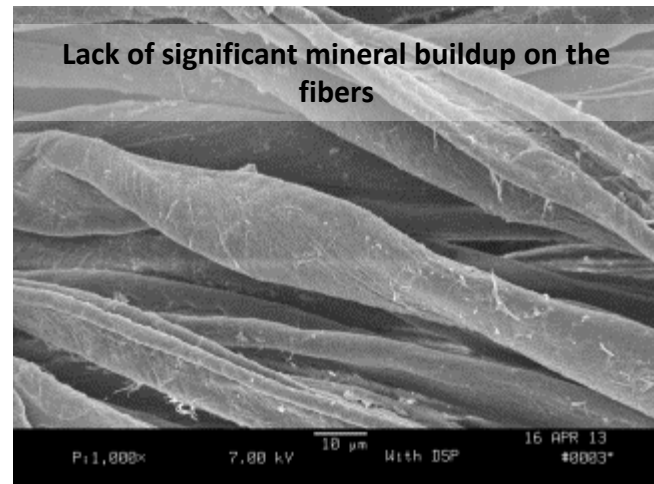


## Anti-Encrustation: Cotton without & with Itaconix® DSP 2K™

Without DSP 2K™



With DSP 2K™

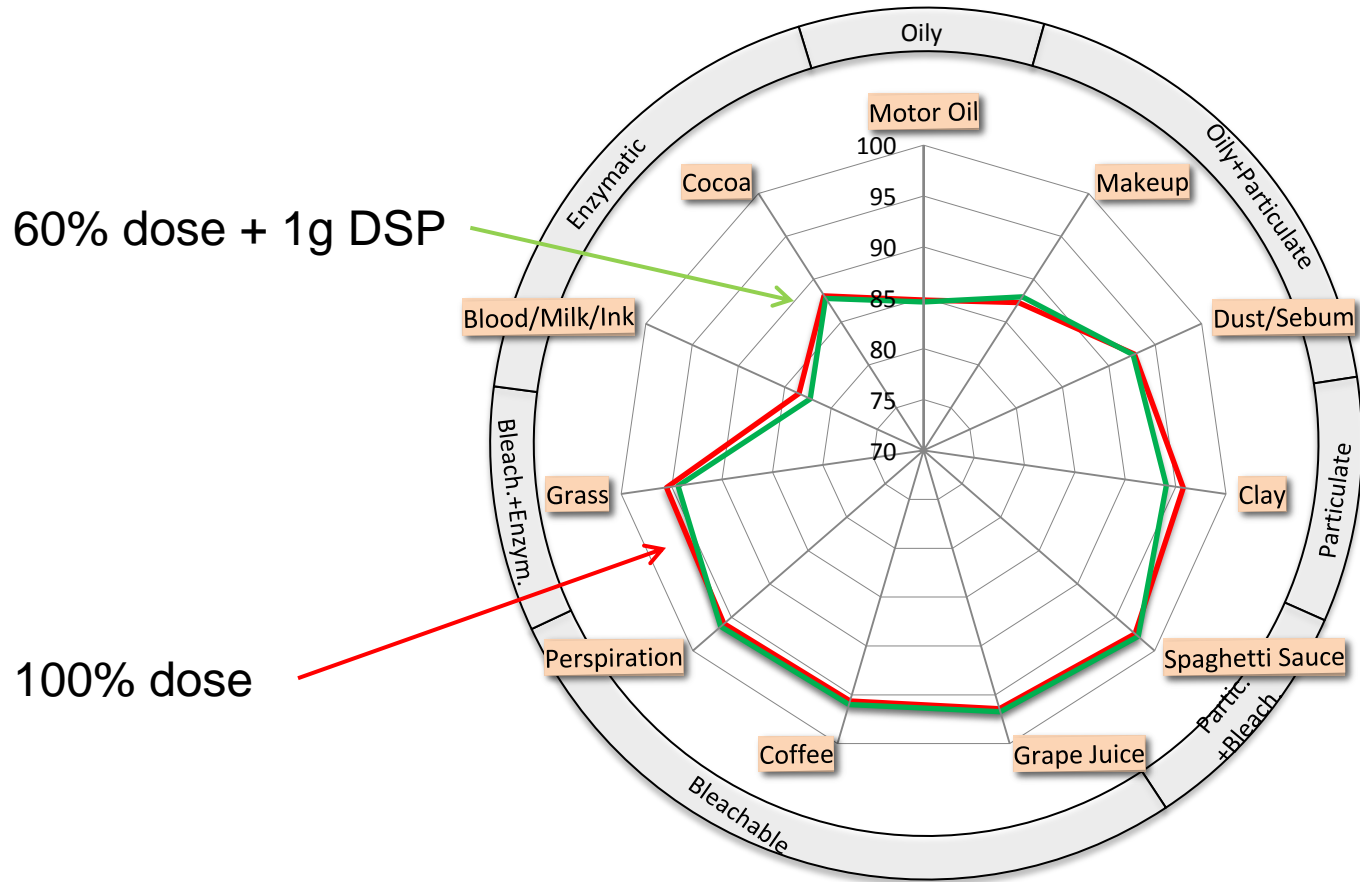


Test method:

Wash temperature: 60° C; Water hardness: 150ppm;  
Wash time: 10 min; Rinse time: 5 min; # of cycles: 15;  
Fabric load: 12 swatches of Cotton #400 from  
Scientific Services S/D Inc.; Detergent concentration:  
0.2 wt%;  
Detergent composition (wt%): sodium carbonate -  
75, sodium metasilicate pentahydrate - 10, DSP 2K™  
- 0/4, sodium chloride - 15/11;

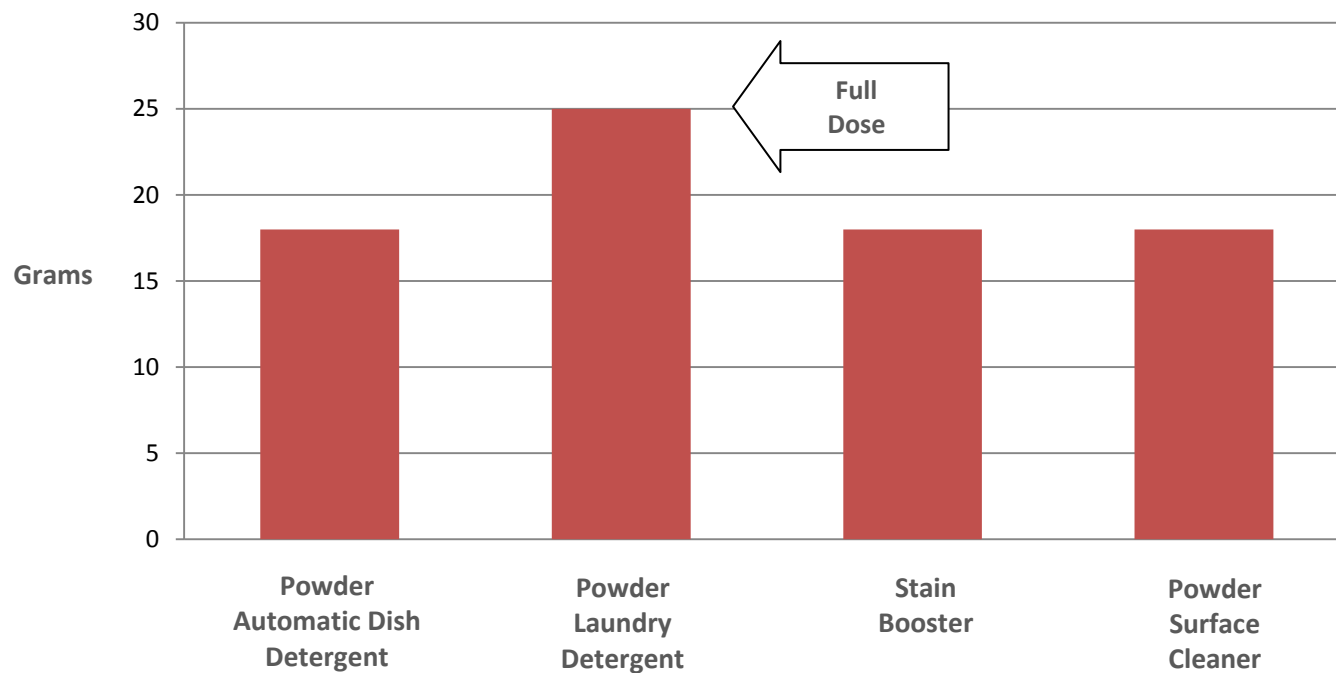


## Leading Powder Laundry Detergent with & without Itaconix® DSP™

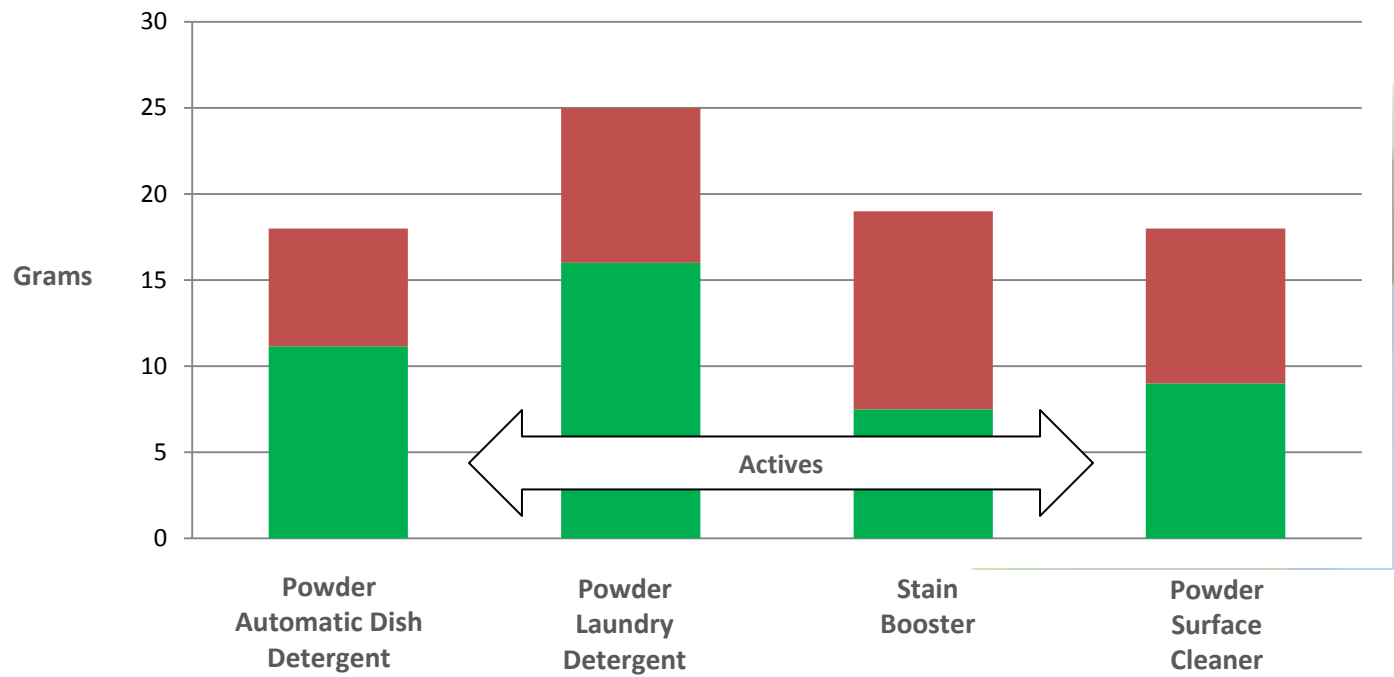


Source: Itaconix analysis

# Monodose Formulating

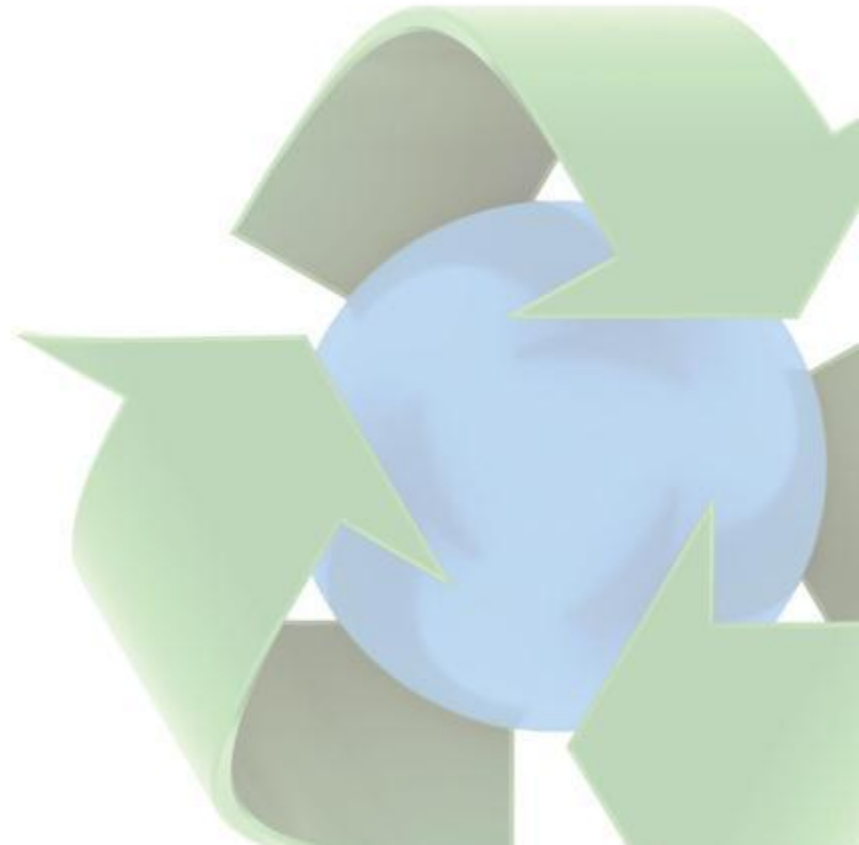


# Monodose Formulating with Itaconix® Dispersant DSP 2K™





**Itaconix® DSP™ - Natural Products Association Certified Ingredient**

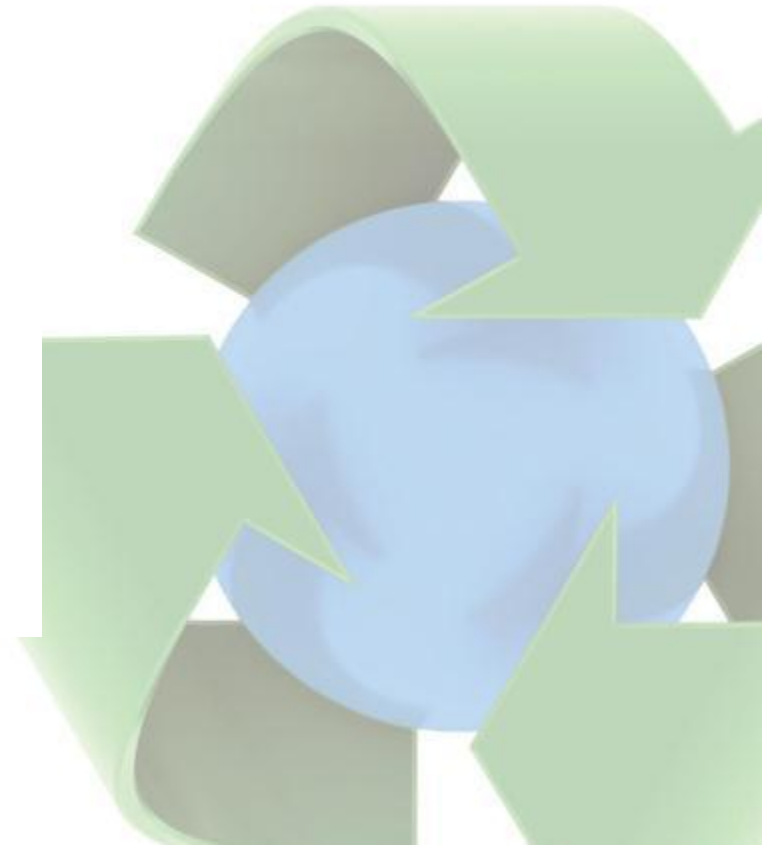




**Itaconix® DSP™**



	<b>Chelation</b>	<b>Dispersion</b>	<b>Detergency</b>	<b>Natural Product</b>
<b>Itaconix DSP</b>	++	+	++	+
<b>EDTA</b>	++	-	-	-
<b>MGDA</b>	++	-	-	-
<b>GLDA</b>	++	-	-	-
<b>Iminodisuccinate</b>	+	-	-	-/?
<b>Citric acid</b>	0	-	-	+
<b>Acrylate polymers</b>	0	++	+	-/?



## Realities of Selling into Detergents & Cleaners

### 1. Sell to a desired claim:

- Performance
- Cost
- Compaction
- Sustainability



## Realities of Selling into Detergents & Cleaners

1. Sell to a desired claim:
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2. Detergent performance is a marketing choice in most categories





## Realities of Selling into Detergents & Cleaners

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  - Sustainability
2. Detergent performance is a marketing choice in most categories
3. Waiting for formulation opportunities



## Realities of Selling into Detergents & Cleaners

### 1. Sell to a desired claim:

- Performance
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- Sustainability

✓ Itaconix® DSP™ polymers

### 2. Detergent performance is a marketing choice in most categories

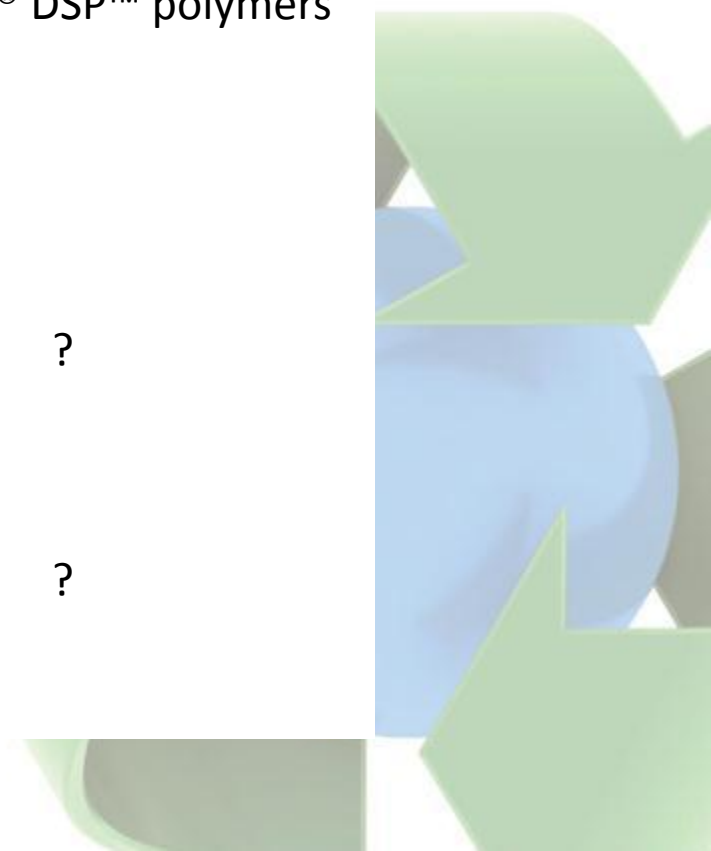
### 3. Waiting for formulation opportunities



## Realities of Selling into Detergents & Cleaners

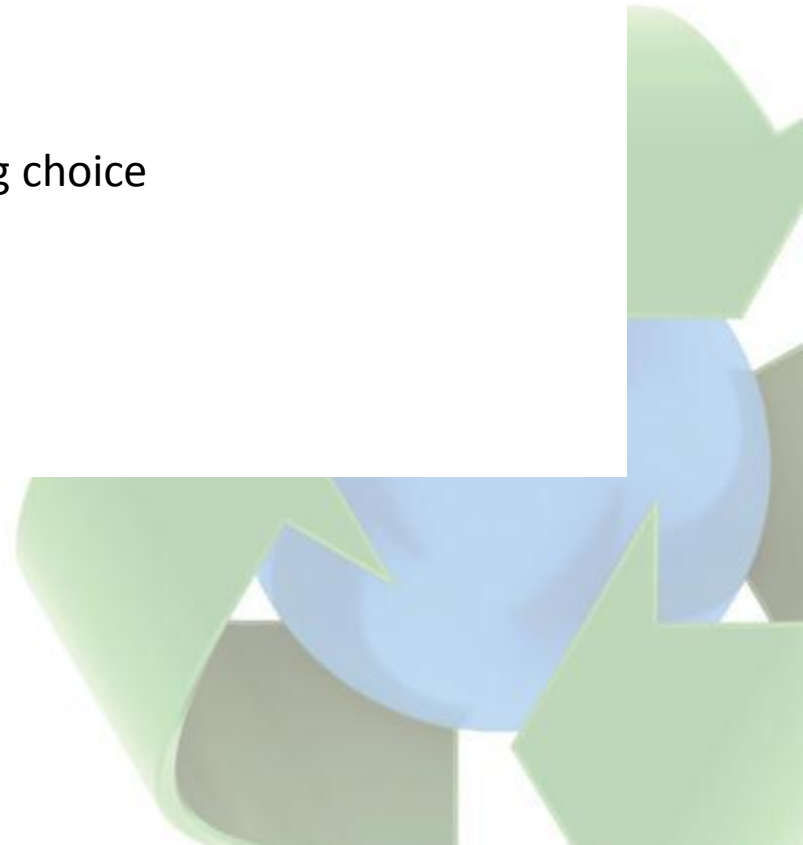
1. Sell to a desired claim:
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  - Cost
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  - Sustainability

✓ Itaconix® DSP™ polymers
2. Detergent performance is a marketing choice in most categories ?
3. Waiting for formulation opportunities ?





1. Work in new formulation areas
2. Make Itaconix<sup>®</sup> DSP<sup>™</sup> part of the marketing choice





## Cleaning Formulations with Itaconix® DSP 2K™

### Consumer Laundry

- Monodose laundry powder
- Monodose stain booster powder
- Monodose machine cleaner
- Bulk laundry powder
- Bulk laundry liquid
- Spot cleaner liquid

### Consumer Dishwashing

- Monodose automatic dishwashing powder
- Bulk automatic dishwashing powder
- Rinse aid
- Monodose machine cleaner

### Consumer Household

- All purpose surface cleaner
- Carpet spot cleaner liquid
- Carpet cleaning machine liquid
- Monodose garbage disposal cleaner





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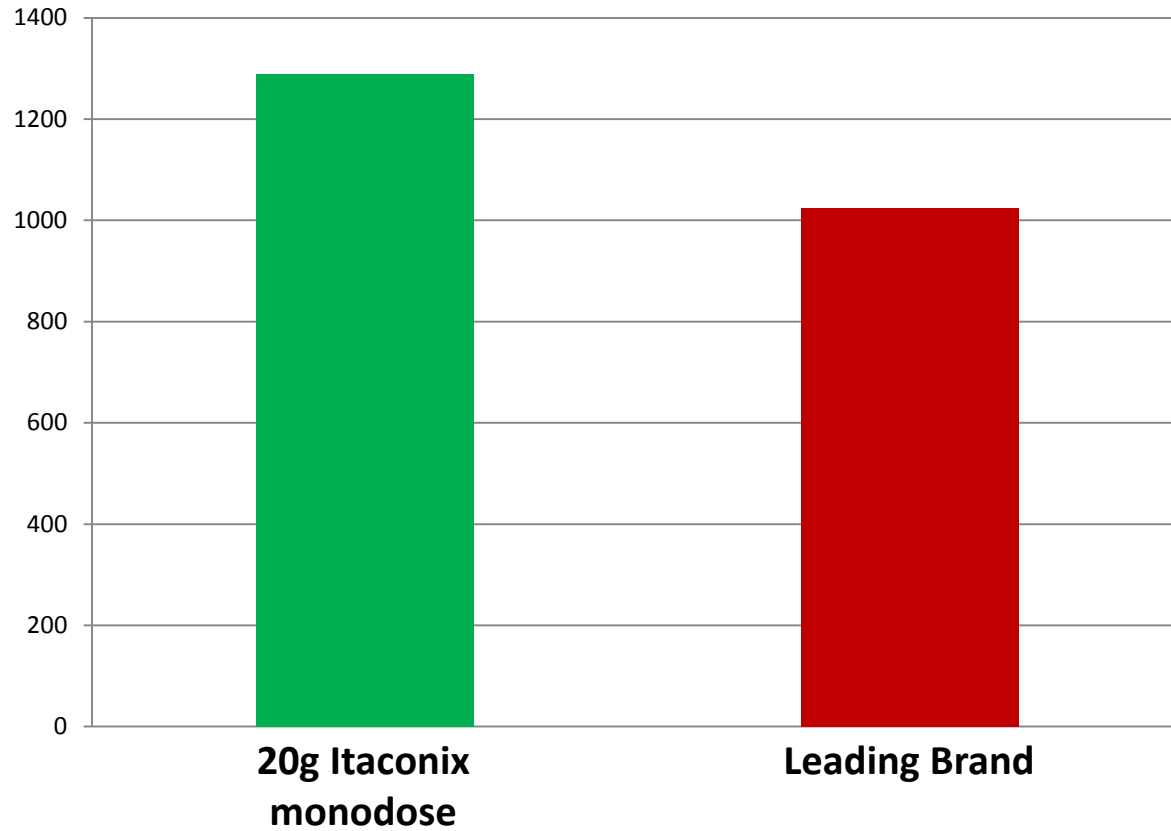
### Consumer Household

- All purpose surface cleaner
- Carpet spot cleaner liquid
- Carpet cleaning machine liquid
- Monodose garbage disposal cleaner



## Stain Removal Performance of 20 Gram Monodose Powder Laundry Detergents

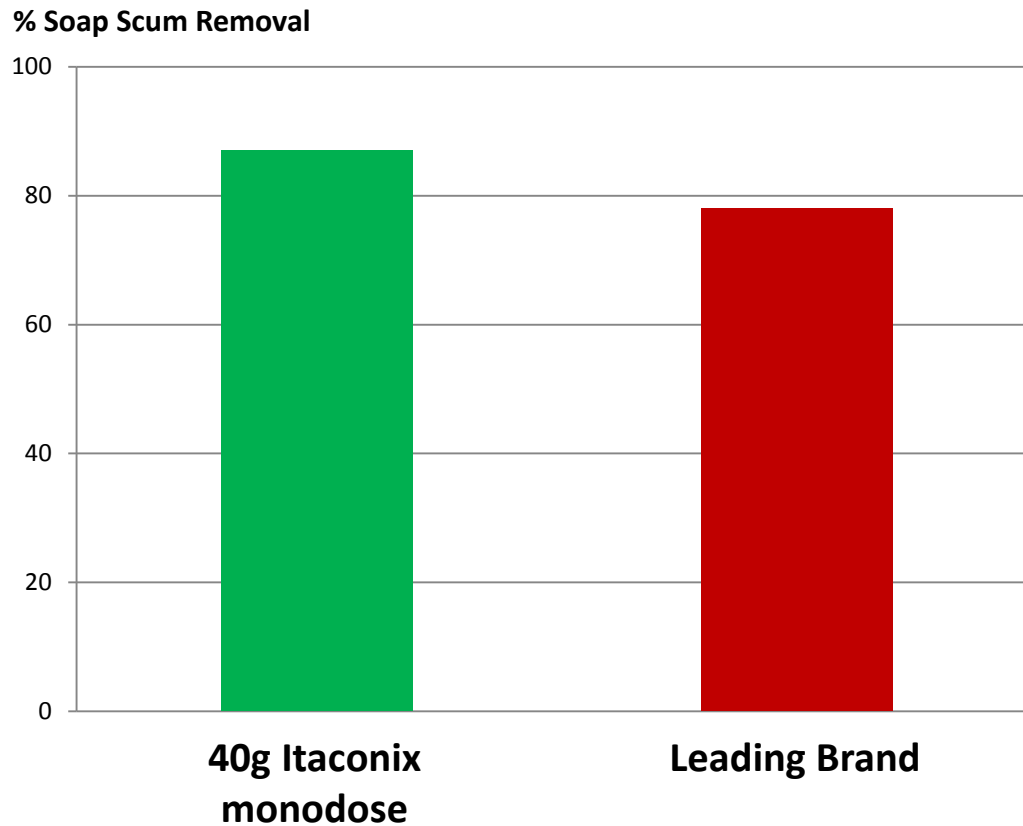
Overall Removal of 27 Stains



Source: Sterling Lab



## Soap Scum Removal Performance of Laundry Machine Cleaners



Source: Sterling Lab





## **New Itaconix® DSP 2K™ Adoption in Detergents & Cleaners**

1. Line extensions and new products for standard brands
2. Line extensions and new products for green brands
3. NBE products for store brands



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We produce polymers for  
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