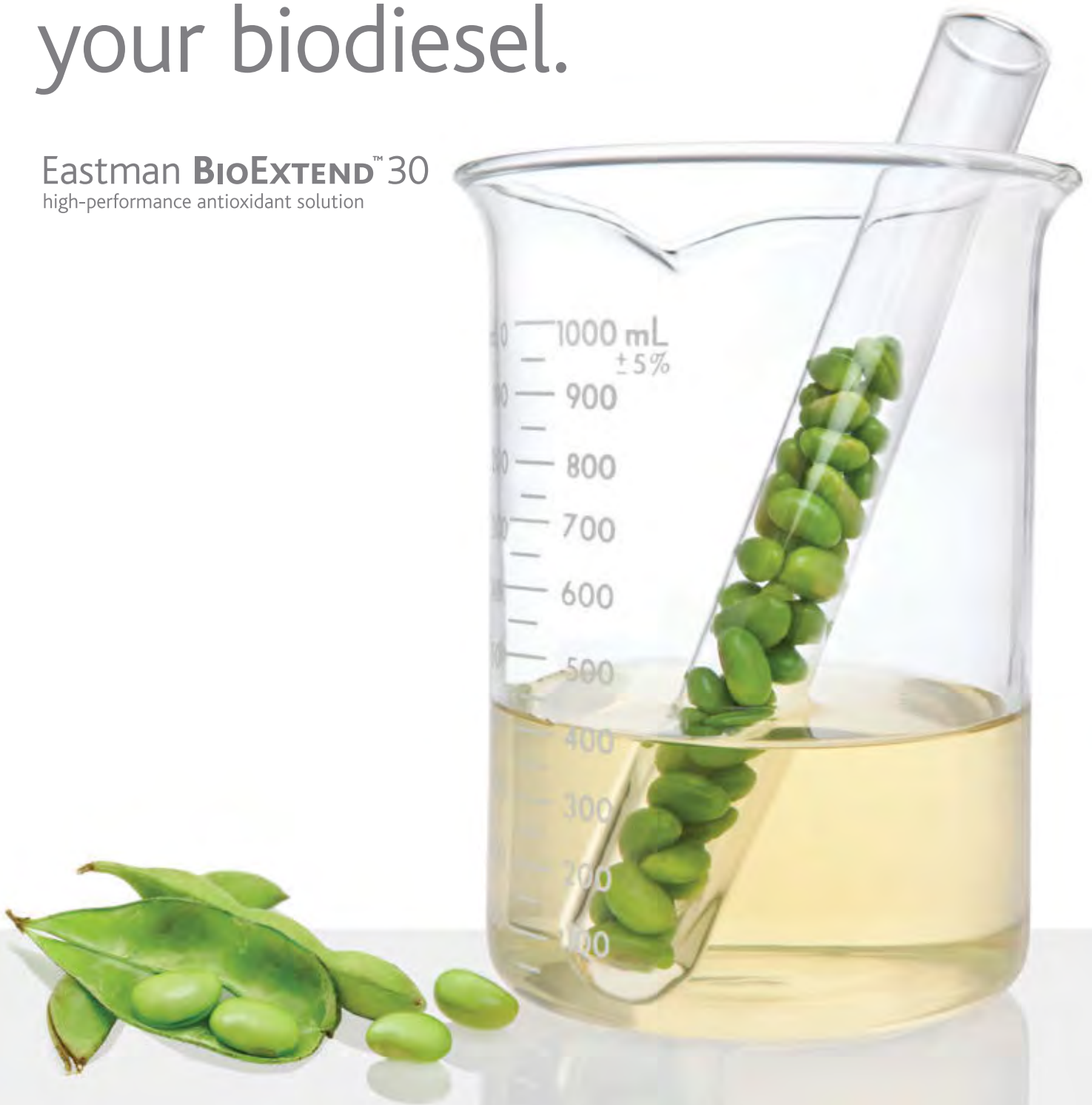


Restore your biodiesel.

Eastman **BIOEXTEND™ 30**
high-performance antioxidant solution



Revitalize biodiesel. Reinvigorate sales.

Eastman BioExtend™ 30 high-performance antioxidant solution is designed to extend the shelf life of biodiesel by inhibiting biodiesel's tendency to react with oxygen. This oxidation can result in polymer formation that leads to clogged fuel filters, damaging deposits, and residues in engines and fuel lines.

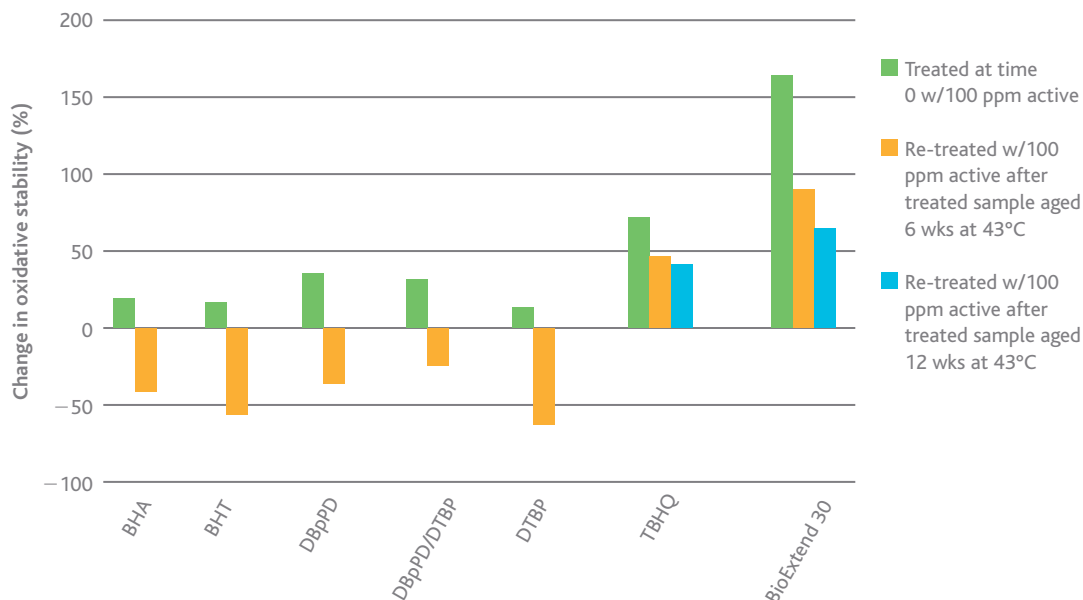
With superior performance at low concentrations, BioExtend 30 impedes the oxidation process to prolong biodiesel's shelf life. Additionally, BioExtend 30 can be used to *revitalize oxidized fuel*—and reinvigorate producers' sales in the process.

The innovation of invigoration

BioExtend 30 is a combination of MTBHQ, a powerful antioxidant, with an effective metal chelating agent. This specific dual-functioning system significantly boosts antioxidative performance.

Figure 1 shows the benefits of re-treating with BioExtend 30 to improve oxidative stability, with substantial improvement even after 12 weeks.

Figure 1: Effectiveness of re-treating biodiesel to improve oxidative stability



In laboratory testing, biodiesel samples were treated with various antioxidant solutions and then re-treated over time to measure changes in oxidative stability. After weeks of accelerated aging, the reintroduction of Eastman BioExtend™ 30 high-performance antioxidant solution was found to improve oxidative stability that had declined with time. Even after 12 weeks, there was a substantial improvement. This improved stability through re-treating can be an advantage to producers who are required to ship their biodiesel overseas or store biodiesel for longer periods of time.

Eastman BioExtend 30 high-performance additive

- Revitalizes oxidized fuel
- Outstanding performance at low concentrations
- Metal chelator protects against metal contamination
- Low-viscosity liquid solution—no premixing
- Low odor
- Formulated for extreme cold—stable at $<-25^{\circ}\text{C}$
- Flashpoint $>40^{\circ}\text{C}$
- Amenable to conventional pumping systems

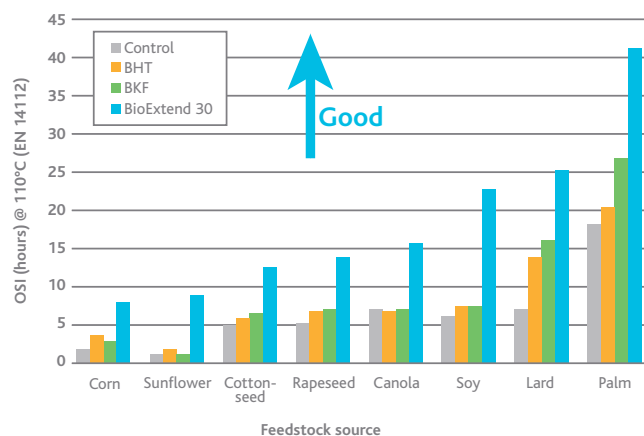
Get high performance at low concentrations

Eastman BioExtend 30 is a ready-to-use solution with excellent miscibility in biodiesel. It does not require dilution with biodiesel or other solvents. Typical addition levels range from 100–500 ppm, depending on the source and quality of the biodiesel, as well as the targeted oil stability index (OSI). As a result, biodiesel manufacturers and distributors use less antioxidant—with fewer steps—to make a superior product available to the market.

Because the amount of required antioxidant can vary from production to production, *Eastman offers free oxidative stability testing* to help producers get the most out of their biodiesel. To request stability testing, visit www.EastmanBioExtend.com.

Figure 2 demonstrates the increased oxidative stability of multiple feedstock source materials after adding BioExtend 30.

Figure 2: Oxidative stability of biodiesel



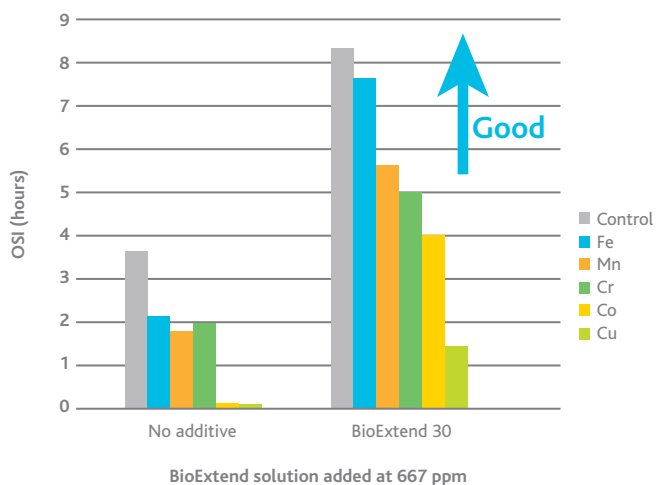
The importance of a metal chelator

Because biodiesel is derived from vegetable oils and animal fats, it can start to oxidize as soon as it is produced. Furthermore, it can also be susceptible to metal contamination from a number of sources, including materials of construction, hard water, and the biodiesel production process itself (which typically uses a metal catalyst).

Some metals might only modestly affect the OSI. Others, however, can have a dramatic effect. In particular, transition metals can have an adverse effect on OSI.

For example, the “No additive” portion of Figure 3 shows suppression of the OSI in a soy biodiesel sample when transition metals such as iron, manganese, chromium, cobalt, or copper are present at 1 ppm. The addition of a metal chelator in BioExtend improves the oxidative stability of the biodiesel by partially sequestering the metal, thus stalling the initiation reaction. As a result, producers can rest assured their biodiesel stocks—as well as their reputations—are best preserved for shipping and sales.

Figure 3: Transition metal contamination at 1 ppm





Energized to help you

From food to cosmetics markets, Eastman has produced best-in-class and easy-to-use antioxidants for over half a century. Today, we leverage that experience and expertise to help preserve biodiesel, an increasingly in-demand alternative for organizations seeking greater sustainability. In addition to BioExtend 30, we also offer Eastman BioExtend™ 30 HP antioxidant solution, specifically designed for sale in European markets.

When you take advantage of our broad scope of technical capabilities and analytical testing, you can be assured you'll get a high quality antioxidant solution—and know the exact quantity to add to protect your biodiesel from oxidation. And when you use BioExtend to revitalize your biodiesel, you will get more life out of your sales, as well.

Get extra mileage out of your markets.
To request free stability testing or for more information, visit www.EastmanBioExtend.com.

EASTMAN

The results of insight™

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