Verza360® Series

Formulating with Power across the Oil & Gas Value Chain

Stimulation & Completion

Production

Midstream

Downstream

Verza360® Series
Formulating with Power

Multifunctional, Bio-Based Solutions for the Energy Transition

The **Verza360® series** (Verza) are multifunctional, bio-based solutions that offer oil and gas companies productivity improvements with sustainable solutions that don't break the bank. This family of products can substitute or boost performance of a variety of traditional chelating chemistries, such as citric acid, EDTA, and THPS, offering wide latitude to achieve optimal performance for iron and scale control, biocide potentiation, corrosion inhibition, and other applications.

Why Verza?

In comparison with the current manufacturing environment where traditional chelating chemistries used to control iron and other substances are primarily imported and made via petrochemical processes with toxic ingredients or are inherently toxic, Solugen is reimagining the way chemistry is made for use across different markets and applications.

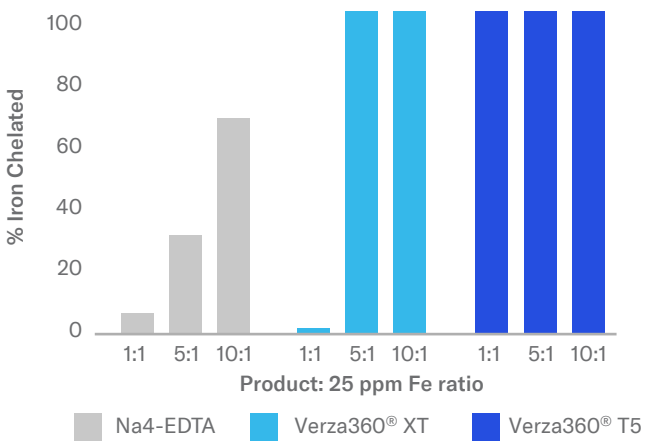
While other alternatives may biodegrade slowly and must be used in a controlled manner, Solugen's **Verza** chemistry is derived from a novel chemienzymatic process that uses enzymes to convert plant sugars into bio-chelants that have low toxicity and excellent biodegradation when exposed to the natural environment. This novel, low-carbon to carbon-negative platform (Bioforge™) also offers flexibility to localize manufacturing, allowing **Verza** to be produced much closer to oilfield activity than traditional alternatives, reducing costs and environmental impacts associated with shipping chemicals.

Solugen's first-of-its-kind Bioforge™ plant in Houston, TX.

High Iron Selectivity to Reduce or Replace Incumbent Chemistries

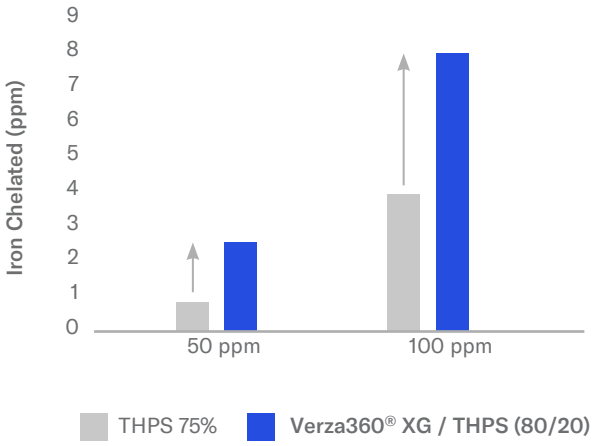
The **Verza360®** series can be used as a complement to or replacement for traditional chemistries used across various oil and gas applications, allowing formulation flexibility to achieve optimal performance, such as iron control, in the desired system.

Performance vs. EDTA



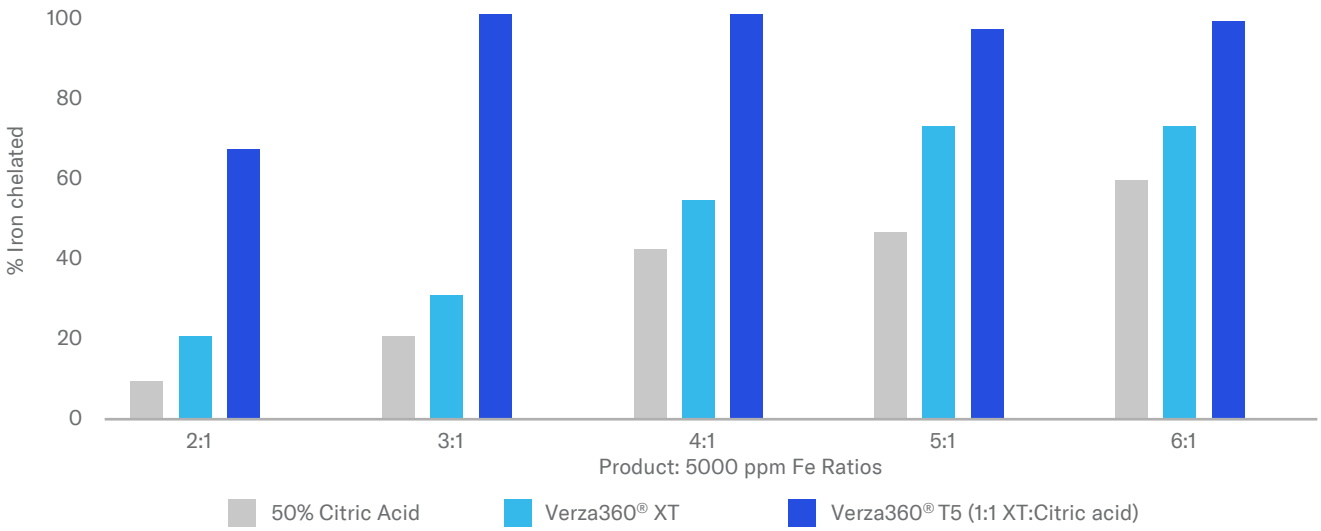
Verza360® uses a third of the concentration of EDTA to achieve the same functionality.

Performance vs. THPS 75%



Addition of Verza360® provides 2X-3X improvement in iron chelation over THPS alone.

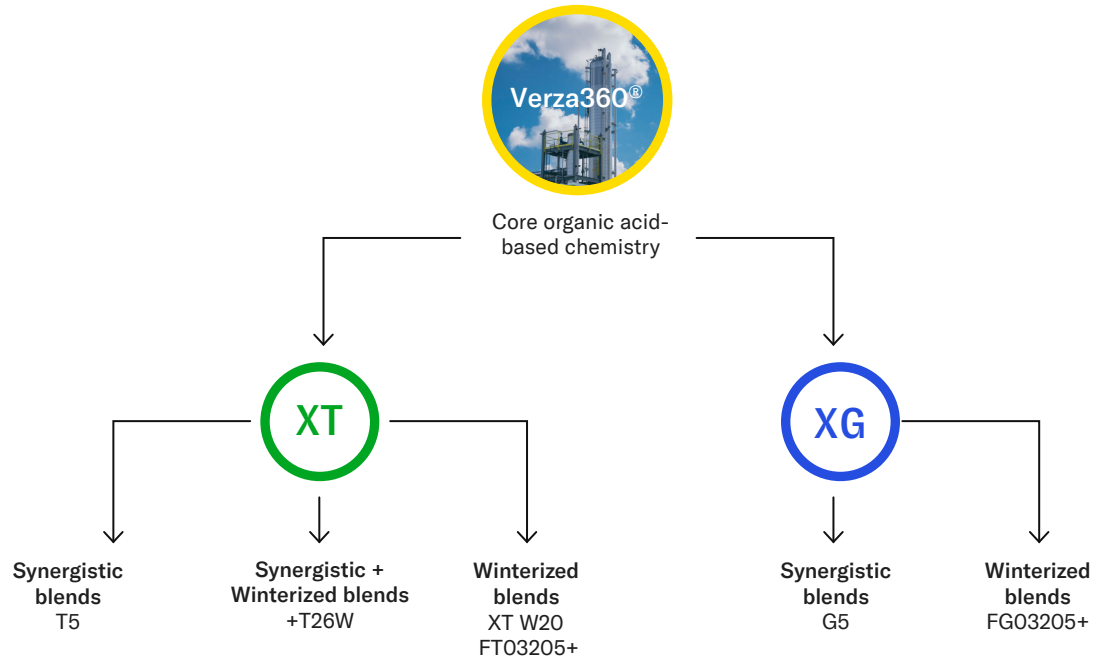
Performance Synergy with Citric Acid



Verza360® cuts citric acid usage by 50% while improving iron chelation.

Solutions that Cover a Variety of Needs

Verza360® Product Range to Suit Different Systems or Conditions



Verza360® Multifunctionality Across O&G Applications*

Application data collected in the lab and/or in the field with the **Verza360®** series to-date has shown broad functionality across the various oil and gas segments as summarized in the table below. Solugen continues to expand upon **Verza360®**'s utility as other applications are explored and understood.

Application	Iron Control	Biocide Potentiation**	Corrosion Inhibition	Scale Inhibition
Acid Stimulation	✓			
Hydraulic Fracturing	✓	✓		
Production	✓	✓		
Midstream	✓	✓		
Downstream		✓	✓	✓

*The above generalizations are not intended to be prescriptive. Given the complexity of oilfield systems, it is recommended that the desired application be discussed with a Solugen representative to make the most appropriate recommendation for the respective system.

**Verza360® does not exhibit any pesticidal activity when used alone. When co-fed with biocides, Verza helps achieve consistent microbial control by reducing interference from inorganic environmental contaminants, such as naturally occurring minerals and metals that can interfere with active biocides. Verza360® products are not registered according to FIFRA and therefore have no associated FIFRA claims.

Pairing Products & Applications to Achieve Optimal Performance

Given the **Verza360®** series' formulation flexibility and chelation capacity observed in the lab and/or in the field, there are numerous secondary benefits that can be achieved. The following table provides some examples where **Verza360®** or combinations thereof have been used to provide such secondary benefits in a variety of applications.

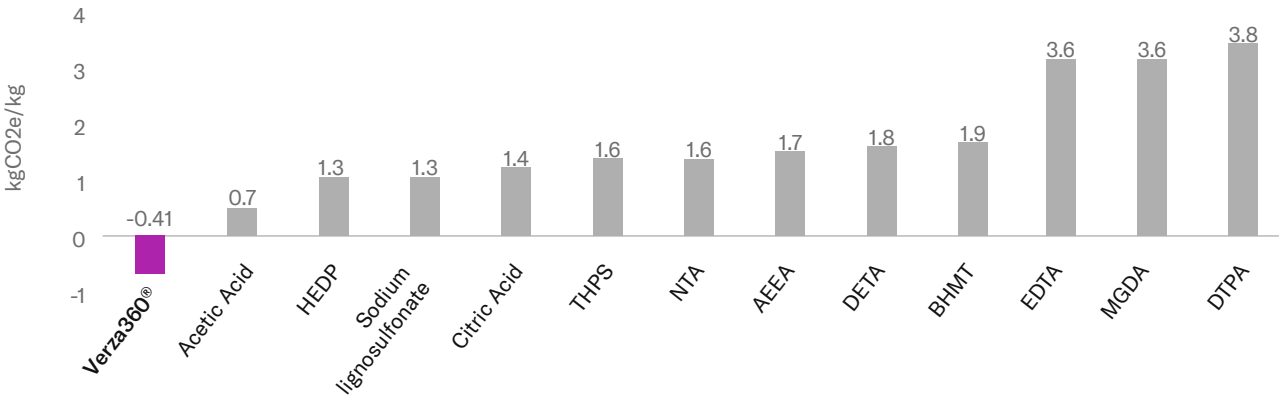
Benefit	Verza360®	Verza360® + Citric Acid	Verza360® + Oxidant	Verza360® + THPS/THPC	Verza360® + SI
Improves oil-water interface and quality	✓	✓		✓	
Reduces filter replacement frequency	✓	✓		✓	✓
Improves water injection quality	✓	✓	✓	✓	✓
Enhances acid stimulation penetration	✓	✓			
Reduces scale inhibitor demand	✓				✓
Reduces biocide demand	✓		✓	✓	
Provides cleaning or anti-foulant properties			✓	✓	

The above generalizations are not intended to be prescriptive. Given the complexity of oilfield systems, it is recommended that the desired application be discussed with a Solugen representative to make the most appropriate recommendation for the respective system.

Reduced Carbon Footprint vs. Incumbent Chemistries

A third-party life cycle analysis (LCA) study performed by Life Cycle Associates revealed that Solugen's unique chemienzymatic process lowers greenhouse gas (GHG) emissions, providing a low-carbon to carbon-negative footprint relative to other commonly used chemicals in the oil and gas industry.

Cradle-to-Gate Life Cycle GHG Emissions for a Variety of O&G Chemicals



About Solugen

Solugen is a bio-based specialty chemicals manufacturer and supplier whose mission is to decarbonize the chemical industry by revolutionizing the way chemicals are made for use across a variety of markets and applications. To learn more, visit **www.solugen.com/oilandgas**.

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