

PRODUCT BULLETIN

Multi-Purpose Mineral Scale Inhibitors

CHEMICAL NATURE

Shotwell's multi-purpose mineral scale inhibitors are water-based solutions of high temperature stable catalyzed copolymers. These products have found utility as an environmentally friendly and biodegradable replacement for phosphonates, phosphate esters and other polycarboxylates such as polyacrylates, polymaleates, their copolymers and terpolymers. Shotwell's copolymer products can be used alone or incorporated as ingredients in formulations used in oil and gas production where downhole temperatures routinely reach 120°C and above.

PHYSICAL PROPERTIES

PRODUCT	%TS	pH	APPLICATION	POUR POINT	BROOKFIELD VISCOSITY @ 22°C	DENSITY @ 22°C
SHSI-2718	30	9.0 – 10.0	CaCO ₃ , CaSO ₄ Inhibitor and Dispersant	-10°C - -20°C	80 – 85 cP	1.22 – 1.26
SHSI-2786	40	9.0 – 10.0	CaCO ₃ , CaSO ₄ , BaSO ₄ , SrSO ₄ Inhibitor	-10°C - -20°C	94 – 98 cP	1.24 – 1.28

Shotwell's copolymers are unique. Unlike other polymeric scale inhibitors, they incorporate an amide unit in the backbone like nylon and most proteins. This unusual structure plays a critical role in allowing the backbone of the copolymer to easily adsorb onto and attach to crystalline surfaces and edges. Together, the carboxylate functional groups impart electrostatic negative density to crystal surfaces preventing them from growing, agglomerating and forming hard scales.

An advantageous characteristic of Shotwell's copolymers is their excellent adsorption/desorption properties for many different types of formation surfaces. This property is especially useful in extending both the hydrolytic and temperature stability ranges in fracking and squeeze processes for these best-in-class eco-friendly polymeric mineral scale inhibitors.

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PRODUCT BENEFITS

Multifunctional

- Best-in-class mineral scale inhibitor
- Strong surface adsorption, superior dispersant
- Useful in squeeze applications
- Calcium compatible at pH 3

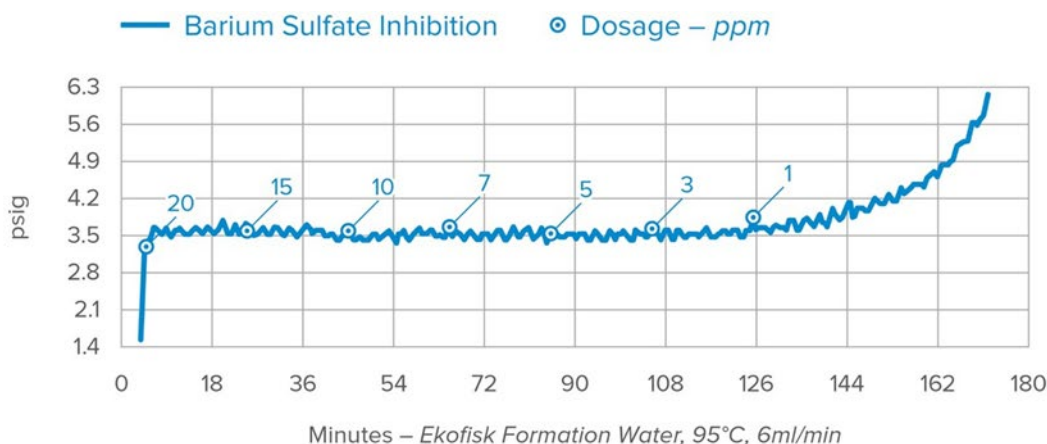
Amide Backbone

- Readily biodegradable (OECD 306)
- Eco-friendly, non-toxic, non-hazardous
- Phosphate free
- Polycarboxylate

PERFORMANCE AND RESULTS

Shotwell's copolymer products were specifically designed to stop and prevent the formation of mineral precipitates and scales. The copolymer's amide backbone is geared toward preventing the surfaces of nucleate crystals from growing through a process known as nucleate threshold inhibition. They adsorb onto nucleate crystal surfaces by attachment of the amide unit, distorting their surfaces, preventing them from adhering to each other or to other surfaces.

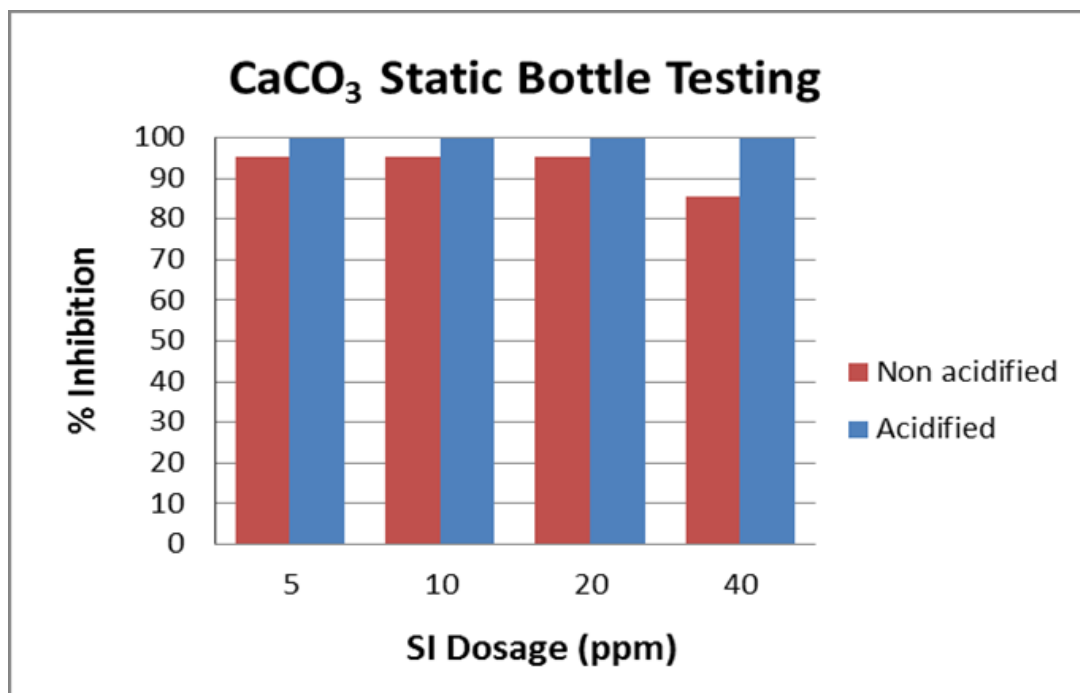
The ability of Shotwell's copolymer products to prevent and control various mineral scales including calcium carbonate, calcium sulfate, barium sulfate, strontium sulfate, iron-based scales and calcium oxalate is well known. In this DSL example for barium sulfate, the copolymer product MIC is determined from the stair-step reduction in product dosage.



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Demonstrating good performance in formulated products where both low and/or high pH requirements exist, a static bottle test for calcium carbonate shows minimum Shotwell copolymer product (SI) dosages.



PRODUCT FORMS & PACKAGING

- Liquid form
- Available in Totes and Drums
- Winterized versions available
- Benign manufacturing in USA in accordance with ISO 9001 standard

PRODUCT CERTIFICATIONS

- REACH
- EPA
- TOSCA

As with all industrial chemicals, contact with eyes or skin should be avoided. Product samples, Data Sheets, and SDS available upon request.