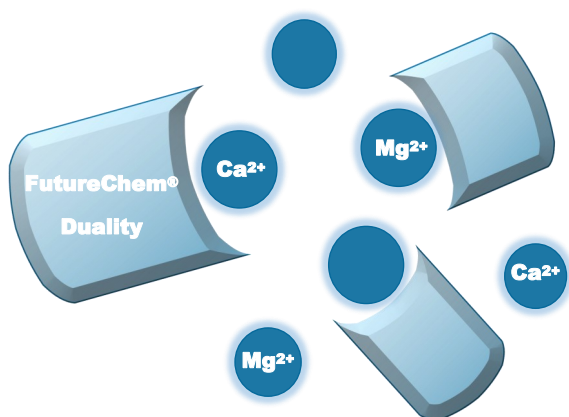


FutureChem[®] Duality

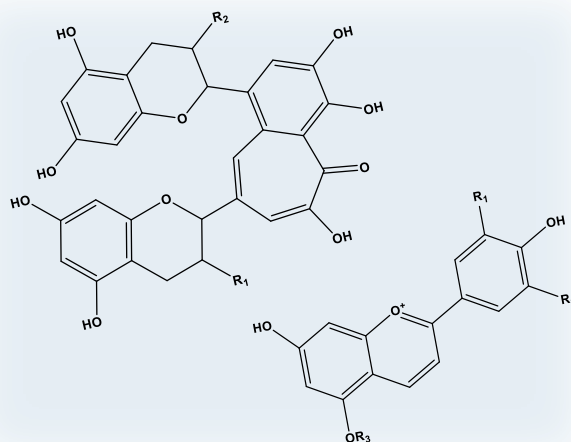
A Dual Function Chelator/Bleach Activator that incorporates '2 cleaning mechanisms into 1 additive'

FutureChem[®] Duality

(+ Peroxide Source)



Chelating Agent for Metal Ions



Bleach Activator for Stains

Competition exists to provide detergent and cleaning products at a reduced cost while maintaining or enhancing performance. Incorporation of '2 cleaning mechanisms into 1 additive' offers flexibility to manufacturers and allows detergents to be formulated where the existing chelator can be reduced and the bleach activator substituted thereby reducing costs.

Features

- ◆ Unique bleach activator with chelation capability
- ◆ Reduces filming and spotting
- ◆ Cleaning agent for stain removal
- ◆ Performance synergy with other chelating agents
- ◆ Soluble in cold and hot water
- ◆ Rapid perhydrolysis in cold and hot water

HI&I Applications

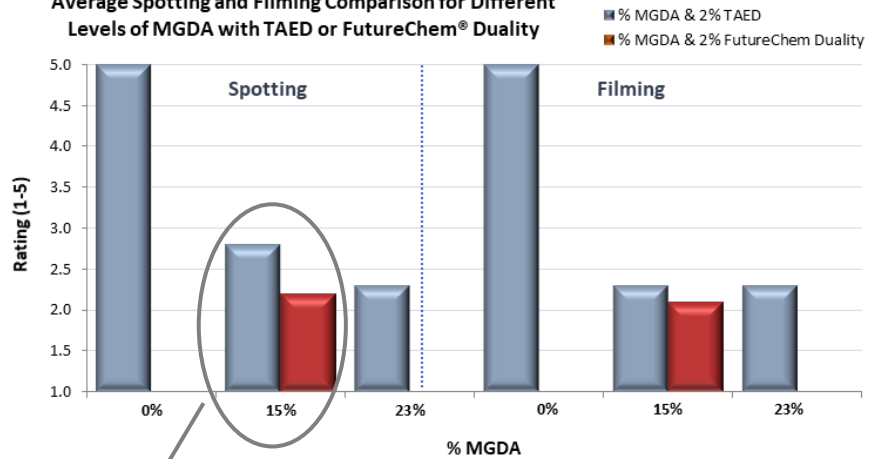
- ◆ Automatic dishwashing detergents
- ◆ Laundry detergents
- ◆ Bleach boosters
- ◆ Hard surface cleaners
- ◆ Disinfectant cleaners

Automatic Dishwashing Detergents

FutureChem® Duality works synergistically with MGDA, or other similar additives, as a chelating agent for hard water ions to reduce spotting and filming on glassware.

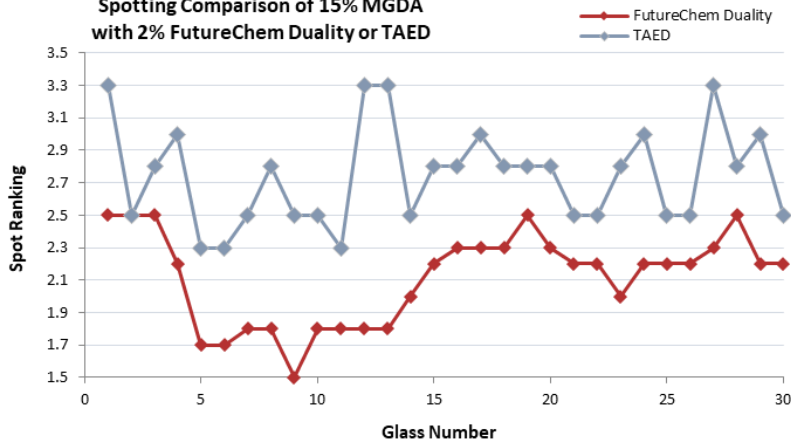
Addition of FutureChem® Duality to a formulation, in place of TAED, **allows 35% less MGDA** to be added without sacrificing performance.

Average Spotting and Filming Comparison for Different Levels of MGDA with TAED or FutureChem® Duality



ASTM D3556 at 250 ppm water hardness
*A lower rating value indicates better performance

Spotting Comparison of 15% MGDA with 2% FutureChem Duality or TAED



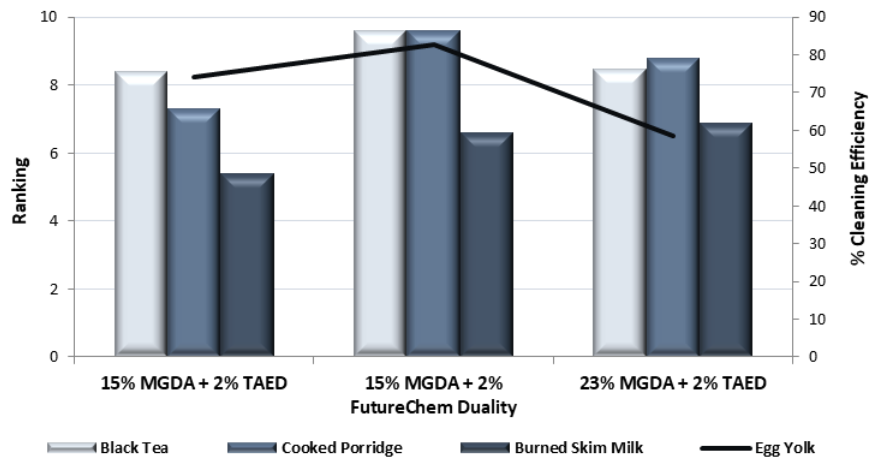
TAED
¼ of washed glasses have spots covering ¼ of the glass

FutureChem® Duality
⅓ of washed glasses have no spots or spots at random

The cleaning mechanism of FutureChem® Duality results in both a chelator and bleach activator, two essential elements for removing stains and food debris from dishware.

The same formulation containing Future-Chem® Duality that demonstrates superior film and spot removal shows enhanced cleaning performance compared to formulations with TAED and increased/equivalent levels of MGDA.

Average Cleaning Performance



IKW—Method for Ascertaining the Cleaning Performance of Dishwasher Detergents (Part B) - 110 pm water hardness (Reprinted with permission from Dell Tech Ltd. London, ON)
*A higher rating value indicates better performance

Detergent formulations were prepared by varying the levels of MGDA, TAED, FutureChem® Duality, and NaCl while keeping levels of builders, surfactants, and enzymes equal.

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