

PROTECT YOUR BRAND AGAINST OXIDATION



ARE FORMULATION CHANGES PUTTING YOUR BRANDS AT RISK?

REFORMULATIONS CAN IMPACT SHELF LIFE

Functional ingredients help protect against three modes of failure:

- COLOR
- FLAVOR
- QUALITY



LIPID OXIDATION

INTERNAL FACTORS

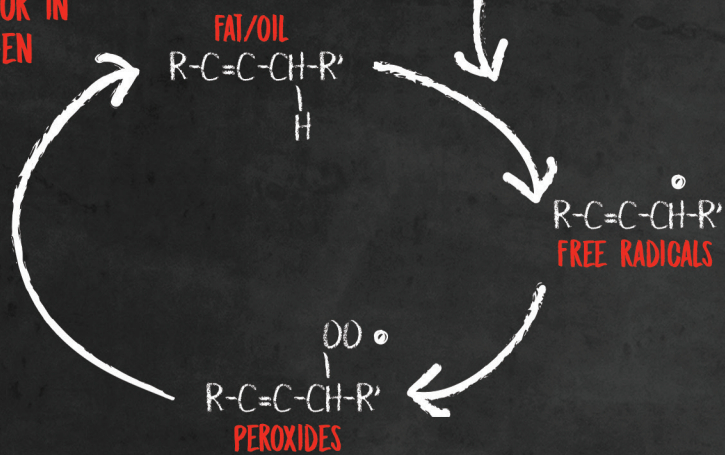
- Degree of unsaturation
- Pro-Oxidants
- Water activity

EXTERNAL FACTORS

- Processing and storage conditions
- Exposure to light
- Ratio of surface area to volume

AUTO OXIDATION

OCCURS IN OPEN AIR OR IN PRESENCE OF OXYGEN



That's where **KEMIN** comes in

ANTIOXIDANT & PLANT EXTRACTS

- ▶ significantly delay or prevent lipid oxidation
- ▶ lengthen shelf life
- ▶ work to maintain consumer brand loyalty

HOW DO THEY WORK?

by delaying onset of oxidation by donating hydrogen atoms to quench free radicals

forming a stable antioxidant radical that is unable to participate in propagation reactions slowing down oxidation



WAYS TO MEASURE EFFECTIVENESS

Accelerated Methods
Storage Studies

SELECTING THE RIGHT SOLUTION

Formulation Considerations

- Oil Stability
- Heat Stability
- Packaging
- Shelf Life

Brand Goals

- Price
- Label
- Transparency

ANTIOXIDANT MODE OF ACTION

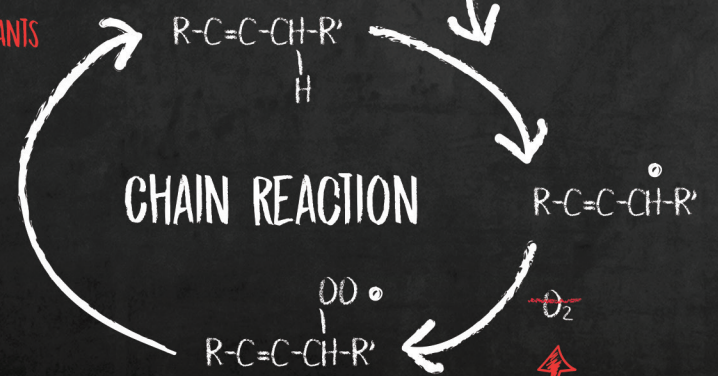
CHAIN-BREAKING ANTIOXIDANTS (RADICAL QUENCHERS)

CHAIN REACTION

OXIDATIVE STRESS
REDUCTION OF NUTRITIONAL VALUE

OXYGEN SCAVENGER

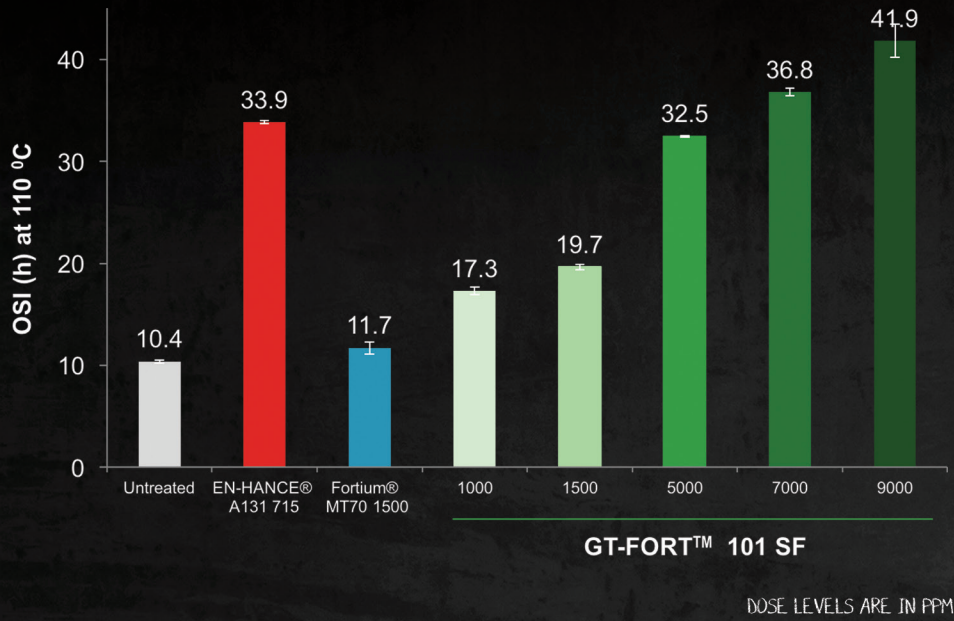
CHELATOR



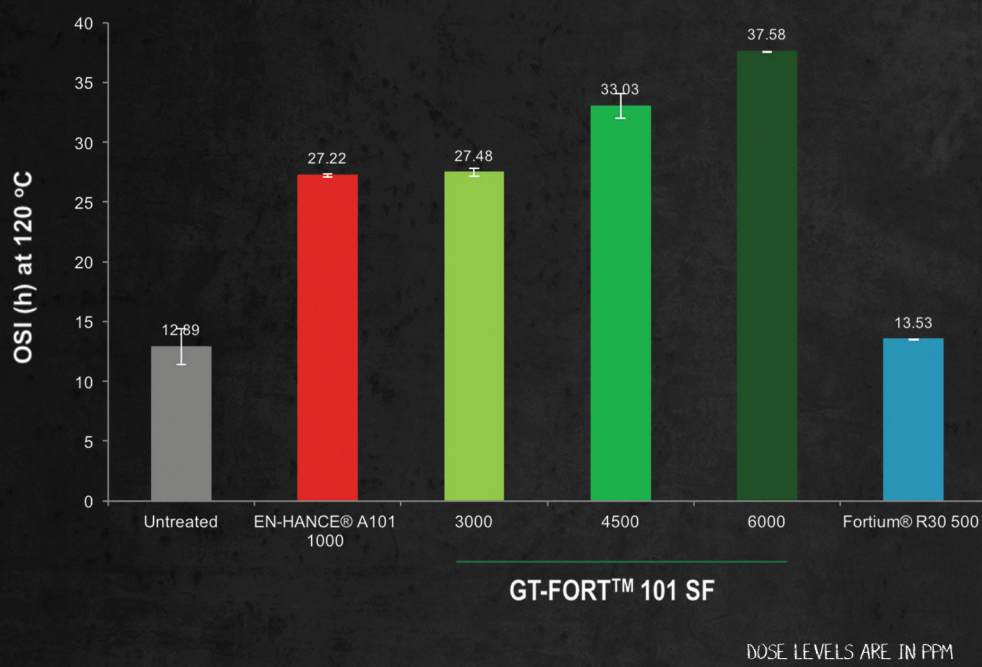
T (°C)
Cu⁺⁺ Fe⁺⁺
Light (hv)



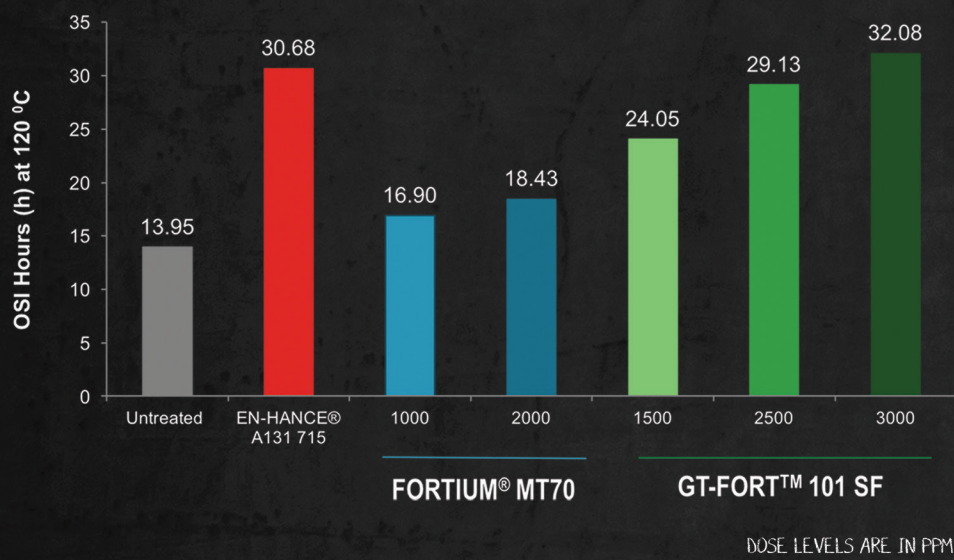
CANOLA OIL



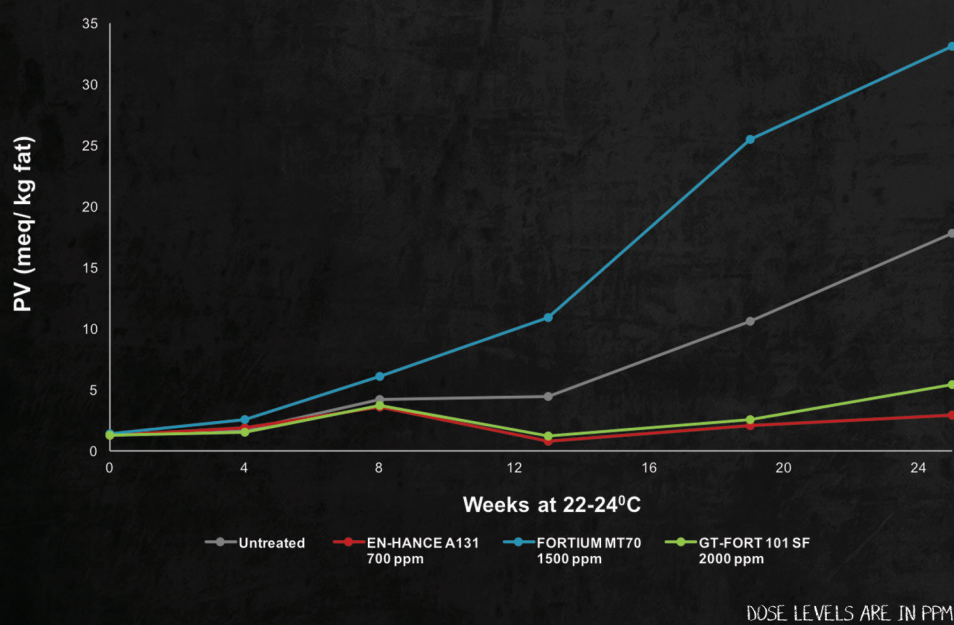
SHORTENING: REFORMULATING WITHOUT PHO



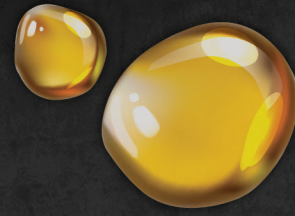
PALM OIL



WHOLE GRAIN CRACKER



OXIDATION CONTROL SOLUTIONS



SYNTHETIC ANTIOXIDANTS

effective
economical
easy to use



TOCOPHEROLS

effective
easy to use
label-friendly



ROSEMARY EXTRACT

well known
label-friendly
oil & water soluble



GREEN TEA EXTRACT

oil & water soluble
label-friendly
heat stable

THE KEMIN DIFFERENCE

Kemin has the technical solutions to keep your bakery and snack products fresher, longer with our lines of value-added antioxidant and mold inhibiting products.

The experienced technical team at Kemin uses their extensive know-how to develop antioxidant, antimicrobial, mold-inhibiting and performance-enhancing solutions that positively affect shelf life. The Kemin team understands how different factors, including mixing procedures, baking and storage temperatures, water activity, and pH, affect the shelf life and consumer appeal of your products, and we provide solutions that address those particular needs. We offer simple solutions as well as complex blends to help you solve your flavor and color, microbial and profit margin challenges, so you can get your product to market and keep it fresher, longer.

talk to an antioxidant expert today!

kemin.com/OXIDATIONCONTROL

KEMIN