



DURASOx™

Highly attrition-resistant SOx reduction additive without performance compromise

DURASOx™ SOx reduction additive is the culmination of intensive development work focusing on obtaining the most attrition-resistant SOx additive on the market without any performance compromises. It follows in the footsteps of Ketjen's longest-marketed SOx additive, KDSOx™, in that both take advantage of Ketjen's patented hydrotalcite technology.

SOx reduction additives are designed to capture and remove the oxidized sulfur compounds present in the Fluid Catalytic Cracking (FCC) unit regenerator and release them in the FCC riser. On release, the sulfur exits the FCC unit as hydrogen sulfide, along with the cracked products in the reactor effluent. The hydrogen sulfide is easily processed in the gas plant downstream of the FCC unit.

Extensive studies in the 1970s looked at the absorption of SOx by various metal oxides and concluded that catalysts based on MgO, Al₂O₃, MgAl₂O₄ (spinel), La₂O₃ and CeO₂ were most suitable for FCC operations. The introduction of hydrotalcite (Mg₆Al₂(OH)₁₆), which is an anionic layered clay, improved the Mg/Al ratio to 3:1

from 1:2 compared with other leading technologies. The importance of the Mg/Al ratio becomes apparent when the mechanism for capture and subsequent release of sulfur via additives is considered. Figure 1 illustrates the reactions catalyzed by SOx reduction additives.

Magnesium acts as the capturing medium by forming magnesium sulfate in the regenerator. Sulfur released from the magnesium sulfate in the riser effectively regenerates the particle and makes it available to capture sulfur again in the next pass through the FCC unit.

Ketjen pioneered and patented hydrotalcite-based additive technologies and first entered the SOx additive market in the 1980s. It is estimated that today about 70% of the worldwide use of SOx additives is based on this technology. Ketjen's patented hydrotalcite-based technology is the preferred option for reducing SOx emissions from FCC units because it offers the highest amounts of magnesium available in the market and, consequently, the highest reduction in SOx emissions.

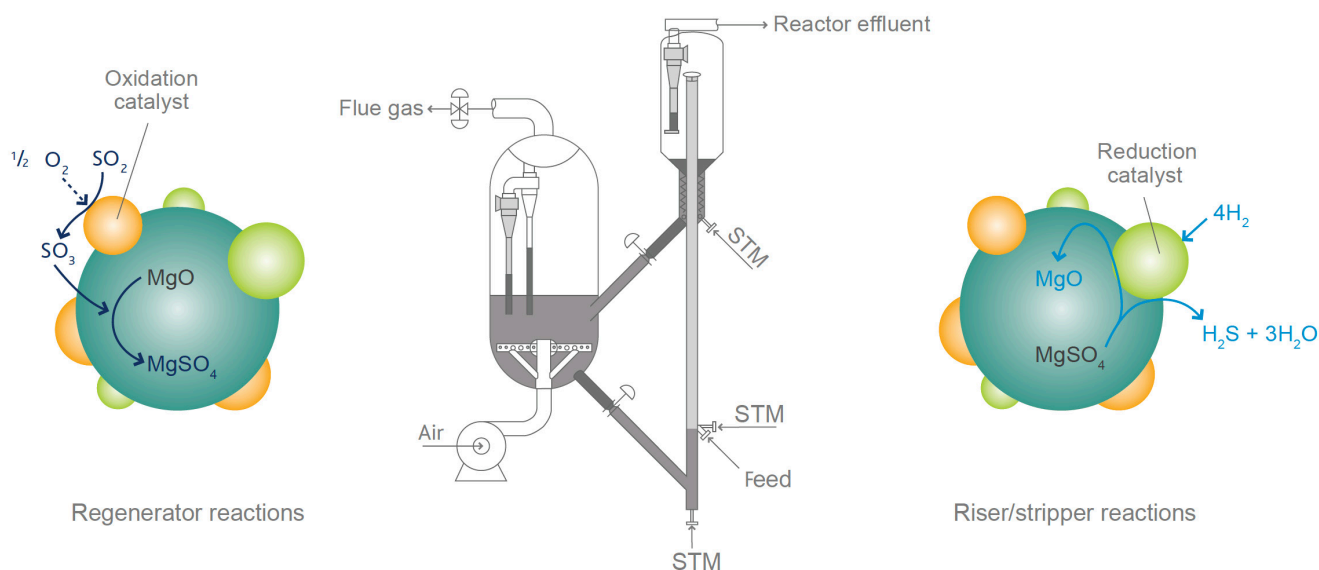


Figure 1: The sulfur capture (left) and release (right) reactions occurring during the use of Albemarle's SOx reduction additives

DURASOx is recommended for the following types of FCC units:

- Full-combustion operation
- Downstream power-recovery turbines and expanders
- Loss-sensitive units
- Opacity compliance issues stemming from the use of soft SOx reduction additives
- FCC units operating under consent decrees with the US Environmental Protection Agency
- Performance-oriented FCC units

A novel binding process is the key behind the success of DURASOx. Figure 2 shows the clear attrition improvement over the KDSOx additive. It should be noted that the attrition index of KDSOx is equal to that of most fresh FCC catalysts.

Besides being more attrition resistant, the binding process utilized in DURASOx enables more active sites to be incorporated into each additive particle.



Figure 2: Attrition resistance improvements provide the opportunity to add more active ingredients and boost performance

Typical product properties	
Additive name	DURASOx™
Application	Sox reduction
Attrition index, wt%	1.5
Average bulk density, g/ml	0.84
Surface area, m²/g	145
Particle size distribution (0-40), %	10
Particle size distribution (0-20), %	1

FOR MORE INFORMATION ON THIS OR OTHER KETJEN PRODUCTS AND TECHNOLOGIES, PLEASE CONTACT YOUR KETJEN REPRESENTATIVE.

AMERICAS: 13100 Space Center Blvd • Houston, TX 77059 • USA • Tel: +1 281 480 4747 • Email: catmaster@ketjen.com
EUROPE AND AFRICA: Nieuwendammerkade 1–3 • 1030 BE Amsterdam • The Netherlands • Tel: +31 20 634 7300 • Email: catmaster@ketjen.com
MIDDLE EAST AND INDIA: PO Box 293774 • 6W Block A, Office 201, 2nd Floor • Dubai Airport Free Zone • Dubai • Tel: +971 4 701 7770 • Email: catmaster@ketjen.com
ASIA PACIFIC: 30 Cecil Street, Gopher Center, #28-05, • 08 Prudential Tower • Singapore 049712 • Tel: +65.6424.8400 • Email: catmaster@ketjen.com
www.ketjen.com

The information presented herein is believed to be accurate and reliable, but is presented without guarantee or responsibility on the part of Ketjen Corporation. It is the responsibility of the user to comply with all applicable laws and regulations and to provide for a safe workplace. The user should consider any information contained herein, including information about any health or safety hazards, only as a guide, and should take those precautions that are necessary or prudent to instruct employees and to develop work practice procedures in order to promote a safe work environment. Further, nothing contained herein shall be taken as an inducement or recommendation to manufacture or use any of the herein described materials or processes in violation of existing or future patents.