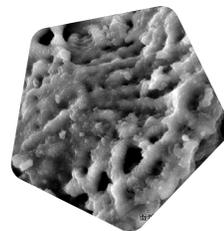




CynerSorb®

Premium range of Filterable Adsorbents for Biofuels

A functionalized filter aid that removes soluble as well as colloidal contaminants, adding value to the biofuel feedstock pretreatment process with reduced annual operating costs or the ability to use dirtier lower carbon intensity feedstocks.



Premium Adsorbent Offering Renewable Diesel

Producers Improved Throughput

With the Cynersorb range of filterable adsorbents, Imerys has eliminated the poor filtration functionality of current adsorbents by starting with a filter aid and then adding proprietary surface engineering.

Biofuel producers are drawn towards lower quality feedstocks, either due to their more favorable Carbon Intensity (CI) values or simply the higher quality feedstocks are already captured in long-term supply agreements with other producers. These feedstocks contain more impurities than virgin oils. Consequently, higher adsorbent dosing rates are leading to choked flows, lower capacity and reduced performance.

Imerys adds value to biofuels produced with lower quality feedstocks at source, with filtration products that improve the quality of rendered fats, DCO and UCO. By removing phosphorus, metals and other contaminants, Imerys' filtration solutions allow "dirtier" fats and oils to meet feedstock specifications of biodiesel, renewable diesel, and other oleochemical plants.

Proven Performance/How it Works

Cynersorb's novelty and value comes from its three-in-one functional design.

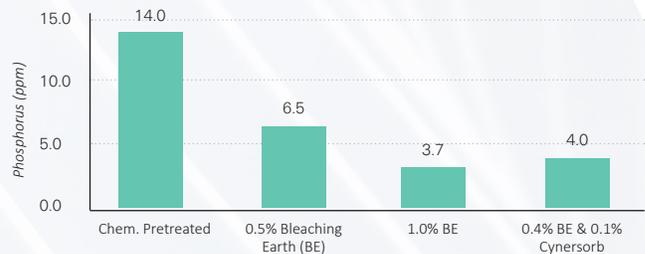
- The diatomaceous earth substrate is used for solid liquid separation, trapping colloidal contaminants within its micropores.
- This 3D network is also used as a scaffold to hold a high surface area reactive silica gel layer, which adsorbs soluble contaminants.
- Finally, this silica gel is used to carry chelating chemistry that reacts with the remaining contaminants transforming them into filterable or adsorbable species.

The result is a highly effective and efficient adsorbent that can be transported, stored and dosed using existing adsorbent handling equipment.

Case Study

Imerys conducted a study with tallow analyzed to have 92ppm Phosphorus (P), then chemically pretreated down to 14ppm phosphorus. Separate adsorbent treatments were then performed. The synergistic effect of treating with a blend of Bleaching Earth (B.E.) and Imerys Cynersorb, a total powder dosage of 0.5%, was able to reduce P to the same level, within experimental error, of double the total B.E. powder dosage.

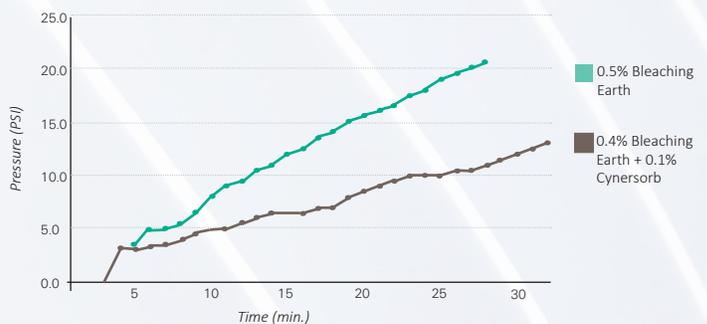
GRAPH 1. Analysis of Phosphorus in Treated Tallow



Outcome

More liquid can be filtered through Cynersorb because it has internal voids in addition to the gaps between the particles, therefore it has a higher permeability than B.E., so there is a higher throughput at the same delta P. These voids also trap particulate contaminants so fast flow is maintained even with very cloudy rendered fats or used cooking oils.

GRAPH 2. Lower Pressure Rise due to High Permeability



Cynersorb helps throughput and reduces powder needs. Due to the high permeability of Cynersorb, blending a small amount, just 0.1% in this figure above, with bleaching earth results in much lower pressure rise over time. The filtration benefit is ~50% less filter area required to process equal volumes of oil feedstock and higher throughput.

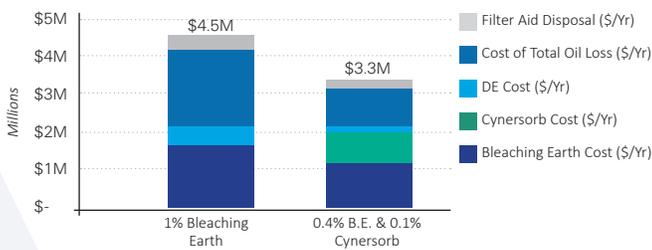




Features & Benefits

Cynersorb offers a family of products with varying filtration characteristics, made to fit unique customer demands while maintaining the benefits of the DE structure, chelating chemistry and soap removal depending on specific needs. Producers using typical feedstock can recognize savings of \$1.2MM per year or more using a Cynersorb/bleaching earth blend over bleaching earth alone. Calculation based on annual production of 100 MMGY, 325 operating days, oil feedstock cost of \$0.68/lb., 30% oil absorption in filter cake.

GRAPH 3. Cynersorb Annual Value Calculation

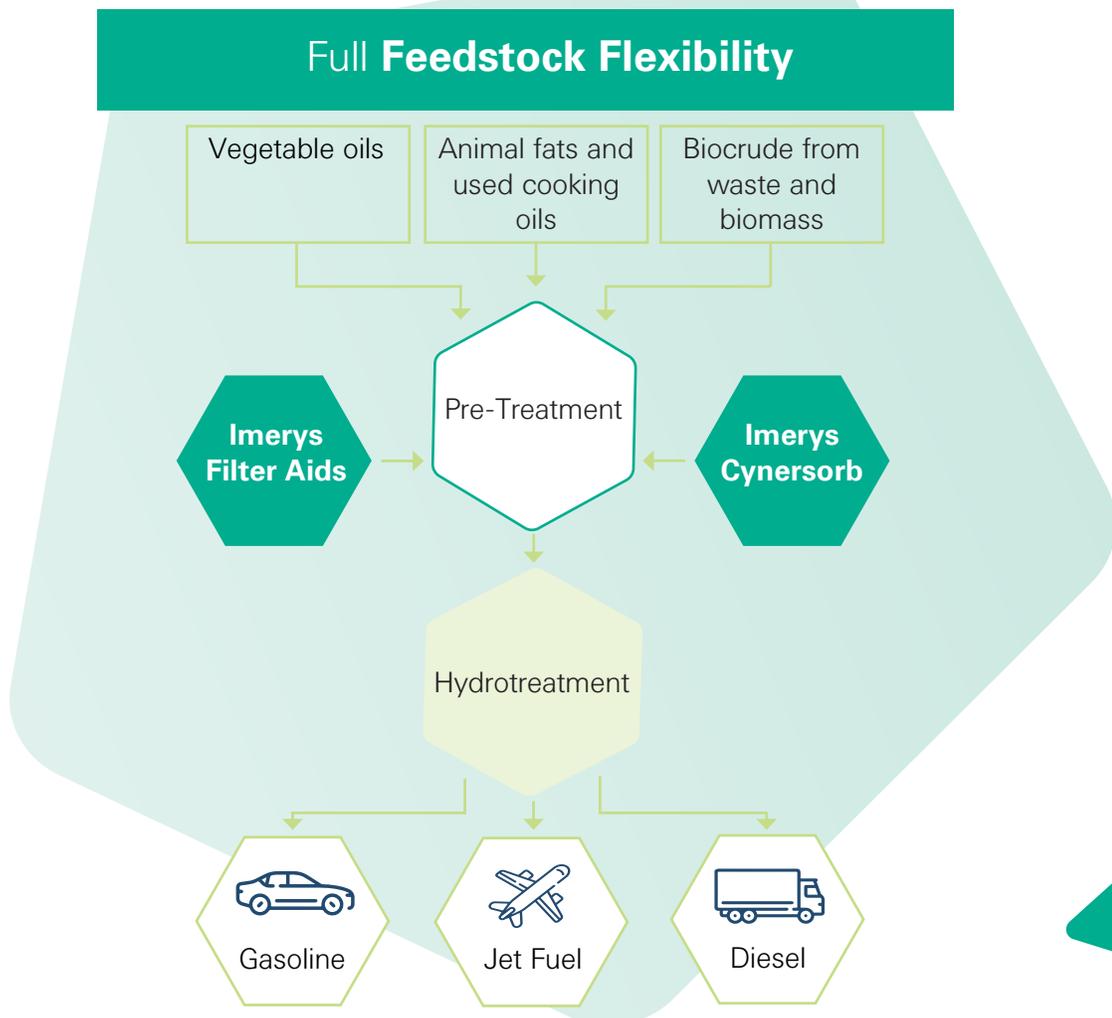


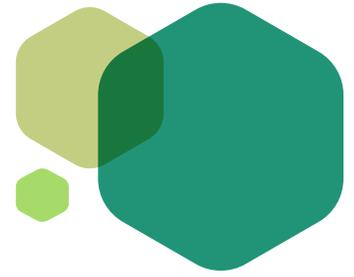
Cynersorb provides superior absorbency while maintaining high porosity, which leads to lower metals at twice the flux rate in filtration. These benefits allow producers to:

- Use blends with lower quality feedstock.
- Extend the life of expensive catalysts.
- Increase throughput 2x in existing systems.
- Reduce the capital expenditure for new pre-treatment systems.

Conclusion

If producers are having issues achieving throughput stemming from feedstock blends or elevated dosing rates hindering pretreatment performance, they should consider Cynersorb. Imerys is engaged in detailed studies into specific feed-stock blends in order to be of higher value to plants that are now being designed. New plants are planning to utilize lower-cost, lower-quality feedstock blends. Coupling Cynersorb's filtration and impurities reduction performance with the side benefit of significant wastecake disposal reduction due to greater cycle lengths and lower dosing rates, some larger biodiesel plants could see a six to seven figure cost avoidance.





INTEGRATING SUSTAINABLE DEVELOPMENT IN ALL WE DO

At Imerys, we respect the world in which we operate. Sustainable development is an essential long term strategy component to support growth. We've adopted a sustainable approach to our extracting and processing activities, while maintaining a focus on ethical, environmental and social demands.

CARING FOR OUR PLANET: We act as responsible environmental stewards by assessing environmental risks and continually improving control measures to reduce adverse environmental impacts; maximizing the efficient use of natural resources, and preserving biodiversity.

BUILDING FOR THE FUTURE: We ensure exemplary business conduct by maintaining the highest standards of corporate governance; respecting and implementing fair operating practices and ensuring a responsible supply-chain with all our partners, and engaging with local communities to create shared value through education and skills development.

Ensuring that our products are safe for people and the environment and developing sustainable solutions that make positive contributions to society from both life-cycle assessment as well as a long term sustainability perspective is key to our success.

DEDICATED TO MINERAL SOLUTIONS: Imerys has regional hubs in Asia, Europe, North and South America. Thanks to a global network of quality controlled production and technology sites located across continents, we can offer a large and varied portfolio. Our integrated logistical networks offer customers the benefits of reliable supply chain services.

A GEOGRAPHIC COVERAGE CLOSE TO CUSTOMERS: With 270 industrial sites, Imerys operates in more than 30 countries on five continents. The geographic coverage reflects our commitment to operating as close as possible to our customers.

