

Peridur[®] organic binder for pelletization

AkzoNobel 



Advantages of using Peridur

Peridur provides:

Excellent pellet growth behavior

Peridur can deal with changes in iron ore mineralogy, as well as variations in blaine and moisture contents. This allows for consistently high production rates limiting the variability in process conditions.

High wet drop numbers at low addition rates

When compared to bentonite, Peridur can provide comparable, if not superior, green pellet strength at a level around 1/20th of the dose rate. Typical results that could be expected are shown in Fig 1.

Even though only small quantities of Peridur are needed to pelletize iron ores (typically addition rates are 0.02% to 0.05%), no special mixing equipment is required to disperse Peridur throughout the iron ore concentrate. Peridur's water soluble nature ease mixing and ensure an even distribution throughout the iron ore mass.

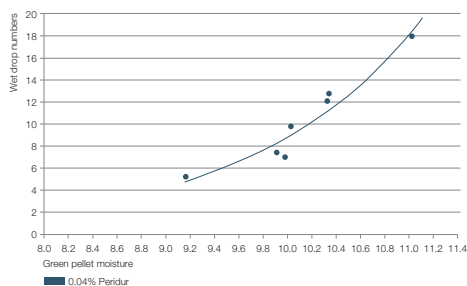


Fig. 1 Wet drop numbers

Resistance to deformation

Peridur pellets, though high in drop numbers are resistant to deformation, whether the deformation is caused by excessive steam build-up on the pellet surface or mechanical vibration during the induration process. The result is improved air flows through the pellet bed and higher production rates. Typical results comparing bentonite pellets to those made with Peridur are displayed in Fig. 2.

High dry strengths

At very low addition rates, Peridur is capable of exceeding the dry strength values of both bentonite and hydrated lime. This is due to a variety of factors, which include a high tensile strength of the binder itself and the ability of the binder to migrate and form bridges at the contact points between iron ore grains during drying. A typical dry strength curve for a hematite pellet made with Peridur is shown in Fig. 3.

Resistance to thermal shock

Peridur pellets are much more resistant to spalling. This is due to the Peridur's controlled

release of water during the drying process. Bentonite traps water tightly in its platelet structure causing the inside of the pellet to remain moist while the outside of the pellet dries. The water trapped inside the pellet eventually turns to steam, builds up pressure, and ruptures the pellet from the inside out.

Improved size distribution and productivity

The use of Peridur will typically result in a more narrow size distribution of the iron ore pellets, an effect of Peridur's excellent moisture control. Some pellet plants have been able to increase daily production rates by as much as 3–4% because of less product rejection by the roll screens.

Cleaner pellet surfaces

Peridur has excellent moisture control and as a result, the green pellets have a very smooth, clean surface. This aids the screening process resulting in more uniform pellets and improved pressures in the drying zones of the furnace.

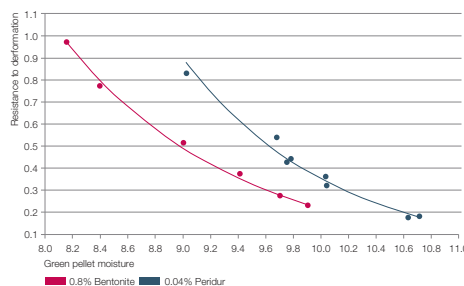


Fig. 2 Green pellet deformation

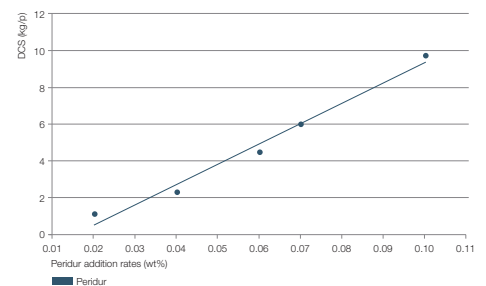


Fig. 3 Dry crush strength

Peridur[®] organic binder for pelletization

Peridur is a commercially proven organic binder developed by AkzoNobel for the agglomeration of various types of ore agglomeration of various types of ores.



Peridur

A family of highly customized formulations originally developed for the agglomeration of iron ore. It has been successfully applied in other businesses like slag agglomeration, other mineral ores and HPS like systems. Peridur is a long chain poly-electrolyte based on cellulose. Peridur enables to control pellet growth rates and sizing, by immobilizing water during the pelletizing process. Peridur provides all the desired characteristics expected from a good binder, and has proven itself on a wide variety of ore types from around the globe. Peridur is non-contaminating to the ore pellets. Being organic in nature. Peridur is eliminated during the pellet induration process.

Healthy and Safe Environment

Safety is one of our core competencies and it is embedded in every step of our manufacturing processes. Our complete range of products is made to the highest quality standards in facilities that are continuously monitored to make certain that our products are safe, our employees are safe and environment is protected as well. All Peridur grades are produced in Italy according to ISO 9001 and 14001 standards. We believe that safety is a culture, and in AkzoNobel safety is embraced by top management and by every employee in the company.

Sustainability

AkzoNobel is consistently in the top of the Dow Jones Sustainability Index (DJSI) for the Materials industry group, being ranked no. 1 for several years in a row. Sustainability is used in our standard business processes and integrated in our strategy and management tools. The entire value chain, from raw material extraction to disposal or recycling of end-products is managed with sustainability goals and targets in mind. We deliver open communication with stakeholders through reporting and verification. Please visit our website www.akzonobel.com to learn more about our company and our commitment to Sustainability. Regarding Peridur specifically, Peridur is a biodegradable, high-performance polymer derived from renewable cotton and wood cellulose. We use cellulose from reliable sources that meet standards set by the Forest Stewardship Council (FSC) and the Program for Endorsement of Forest Certification (PEFC). This ensures our use of the renewable resource.

Metallurgical Advantages

Peridur can also improve the metallurgical properties of the iron ore pellets.

Higher fired pellet porosity and reducibility

Peridur is burned off during induration leaving more porous pellets than those made with bentonite. This implies that an improvement in reduction properties can be expected, leading to a substantial overall savings in the steel making process.

Lower FeO contents

With the more porous structure, pellet oxidation is more uniform and complete, resulting in lower FeO contents of the agglomerates.

Higher melting temperatures - Blast Furnace applications

In Blast Furnace applications Peridur results in higher pellet melting temperatures, critical for reducing the size of the cohesive zone. This is largely attributed to the removal of the low melting silicates associated with the use of bentonite. The smaller cohesive zone has a positive impact on production rates in the Blast Furnace.

Lower gangue contents - Direct Reduction applications

Lowering of the acid gangue constituents (through removal of bentonite) results in improved operational costs at Direct Reduction steel making facilities. Substantial improvements in yield, flux consumption, slag disposal, and energy consumption can result in costs savings of up to 2.50 USD/mt of hot metal in Electric Arc Furnaces. Additionally, the use of Peridur compared to bentonite results in lower energy usage, and less waste generation.

Special activation systems

In many cases, the cost performance of Peridur can be improved through the use of special activation systems. The activation systems are synergistic in behavior and allow for significant reductions in the addition rate of Peridur products, at the same time improving the physical characteristics of the iron ore agglomerates at improved cost performance. Proprietary technology provides for improvements in green and fired pellet characteristics, both of which can be altered to suit the client's needs.

Additional benefits

Concentration plant

Peridur allows the use of lower grade ore. The need for a less selective beneficiation/flotation process increases capacity of flotation cells or reduced grinding needs, hence cost efficiencies. When Peridur is used as a bentonite replacement in the pelletization process, silica specifications of the iron ore concentrate can be made less restrictive. The result is higher iron recovery, lower grinding costs, less reagent usage, and increases in productivity of the concentration plant.

Pelletization plant

During induration, less airborne dust is generated and environmental conditions around the plant improve.

Transportation

When bentonite is replaced by Peridur, pellet consumers further benefit from a reduction in shipping cost per unit of iron. Iron contents in the pellets can be increased by 3-4%, resulting in more "iron" units shipped per cargo load.

Technical support

AkzoNobel assists clients during development stages with technical support built up through years of intense involvement in the iron ore industry. The dedicated application and engineering team ensures that a cost effective formulation is developed, and the expertise in material handling and iron ore processing make sure that the best system for dosing is arranged during plant tests as well as commercial installations. A more complete picture of the technical support provided would consist of:

- Our technical application group carefully studies the iron ore concentrates from a sizing, mineralogical, and chemical point of view.
- Peridur formulations are optimized and tested thoroughly in pelletization tests. AkzoNobel uses its own internal pelletizing laboratory as well as contracted testing facilities to test its formulations.
- During plant testing, AkzoNobel can supply/recommend dosing systems to accurately control the dosage rate of our Peridur formulations, and provides assistance during plant tests to see that the Peridur is used as effectively as possible.
- After commercialization, we continue to search for more cost effective formulations and work closely with the client's processing departments as part of our continual improvement program. It is our commitment to the industry!

Agglomeration aids

Upgrading naturally found ores is accomplished by grinding the ore into fine particles so that the valuable materials can be liberated from unwanted gangue.

This beneficiation process leaves the ore in a finely ground state that is not easily transported or readily processed into the smelters. Therefore, it is necessary to agglomerate the fine found material into pellets using various binders, afterwards indurating the newly formed pellets to strengths high enough to survive transportation. In iron ore agglomeration, three binders are generally accepted:

- Bentonite, a naturally occurring clay found in deposits of varying qualities around the world.
- Hydrated lime, produced by the calcinations of limestone.
- Organic binders, either natural or synthetic, such as the cellulose based material produced and sold by AkzoNobel under the name of Peridur.

Bentonite, while long considered to be the industry standard, has the disadvantage of adding unwanted silica into the pellet. Some

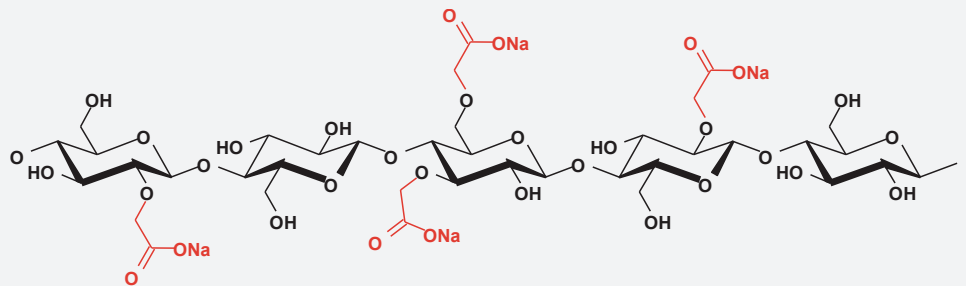
forms of sodium bentonite are known to contain more than 65% SiO₂ by weight. This additional silica blocks the porosity of the pellet inhibiting the flow of reducing gasses into the interior regions of the pellet. This lowers the reducibility, increasing

- a) the energy requirements in the steel making process and
- b) the costs for handling and disposal of increased slag levels.

Hydrated lime has a slight advantage over bentonite when silica levels are the primary concern of steel makers. However hydrated lime is incapable of controlling water during pelletization, and does little to contribute to the cohesive/adhesive forces required to form and maintain green pellet integrity. This results in poor quality green pellets that are fragile and

easily broken, lowering production rates at iron making facilities. Furthermore, due to the massive amounts required for basicity control and pelletization, hydrated lime can contribute to spalling of pellets decreasing the quality of the finished product. Peridur, on the other hand, offers the perfect alternative.

Peridur is non-contaminating to the ore pellets. Being organic in nature. Peridur is eliminated during the pellet induration process. Its products of combustion consist of carbon dioxide and water vapor, and contains no elements like sulfur, phosphorus, or nitrogen, that would be detrimental to the quality of the metals and prevents the emission of corrosive pollutants into the atmosphere. Peridur can replace bentonite partly or completely, depending on ore characteristics.



Peridur

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AkzoNobel is a leading global paints and coatings company and a major producer of specialty chemicals. Calling on centuries of expertise, we supply industries and consumers worldwide with innovative products and sustainable technologies designed to meet the growing demands of our fast-changing planet. Headquartered in Amsterdam, the Netherlands, we have approximately 46,000 people in around 80 countries, while our portfolio includes well-known brands such as Dulux, Sikkens, International, Interpon and Eka. Consistently ranked as one of the leaders in the area of sustainability, we are committed to making life more liveable and our cities more human.

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