Classification and dewatering of non-metallic minerals

Tailored calcium carbonate and kaolin treatment for industrial needs

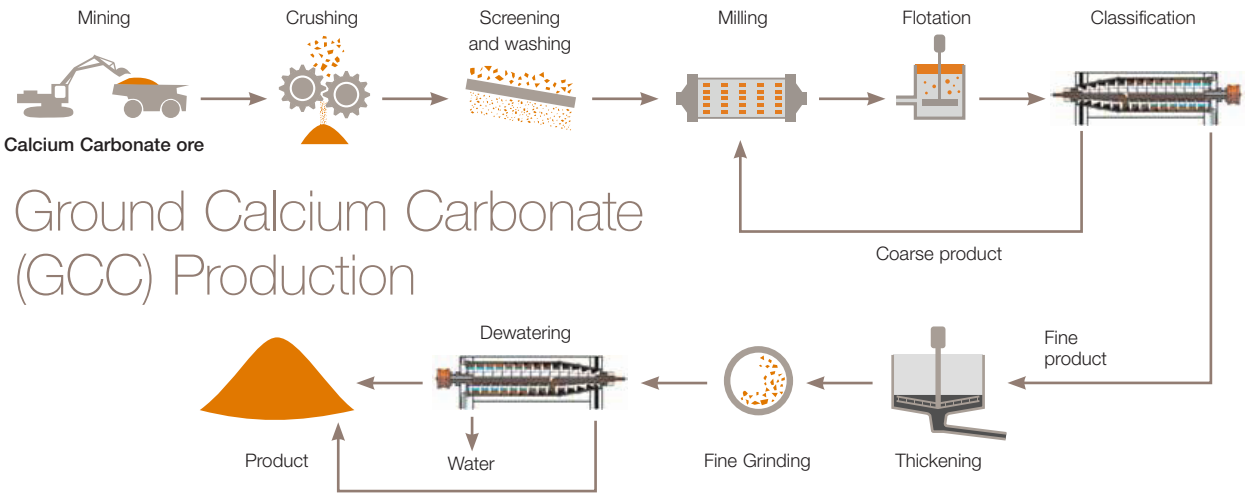
In the production of non-metallic minerals, classification and dewatering are two process steps that can significantly affect your profitability. As drying is an energy-intensive step, effective dewatering ensures fast and more economical processing. To further maximize the commercial value of your end-product, accurate control of the classification step makes sure that you obtain the final particle size and purity needed to meet specific target application requirements.

Using Alfa Laval decanter centrifuges ensures continuous, operator-friendly minerals dewatering with accurate control in a fully enclosed process step, which contributes to a better working environment.

Process overview

Calcium carbonate and kaolin, found in quarries all over the world, are among the most widely used minerals. After a number of treatment steps they are used not only as pigments in paint and paper products, but also in ceramics and cosmetics. The typical production method involves mechanical processes such as crushing, screening and washing, followed by classification and dewatering. The drier the product is after dewatering, the more energy can be saved in the final drying step of the calcining process.

Product requirements can be very specific, which creates a need for a suitable process for tailor-made production. The final particle characteristics are often critical for specific applications, making it imperative to obtain a well-defined particle size distribution or specific purity.



Ground Calcium Carbonate (GCC) Production

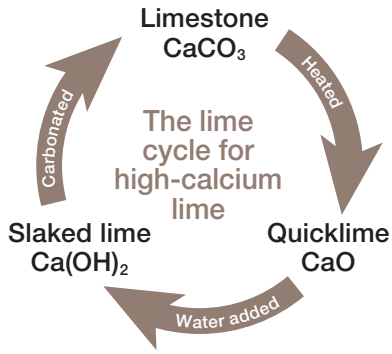
Calcium carbonate production

Calcium carbonate is readily available in quarries around the world. It is mined as limestone and can be ground to the right particle size. This produces GCC (Ground Calcium Carbonate) via a mechanical process in which the mineral is washed by a large volume of water.

PCC (Precipitated Calcium Carbonate) is another calcium carbonate production method. The limestone goes through the same primary mechanical crushing process, but is then heated to 1000°C in a calcination tower.

Kaolin production

Kaolin is a general name for minerals such as kaolinite and halloysite, which are mainly used in paper filling and coating, as well as plastics, rubber and paint.



Kaolin, one of the principal ingredients of ceramic goods, is often called "china clay".

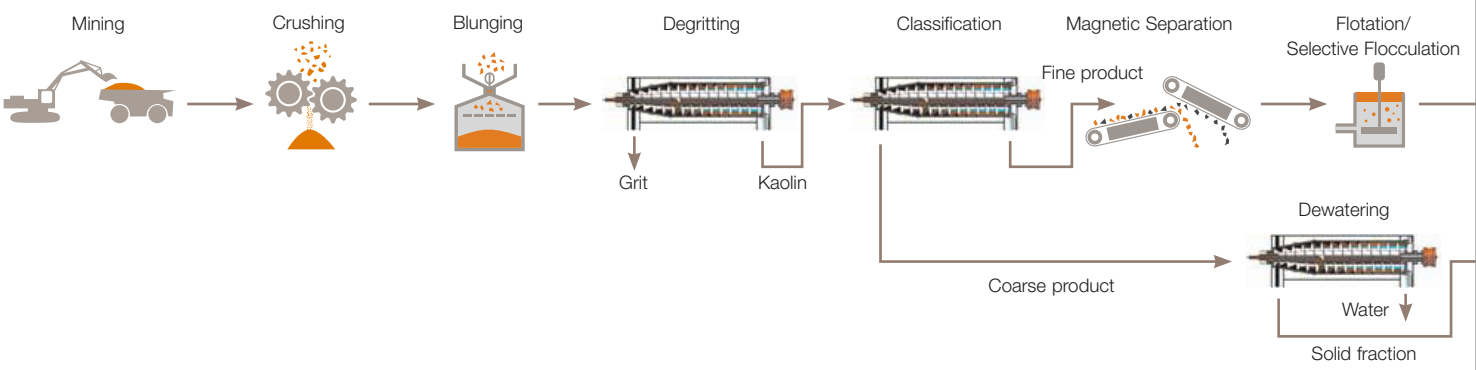
The kaolin production process has strong similarities with the GCC process, as it includes both classification and dewatering steps in which a decanter centrifuge can be used.

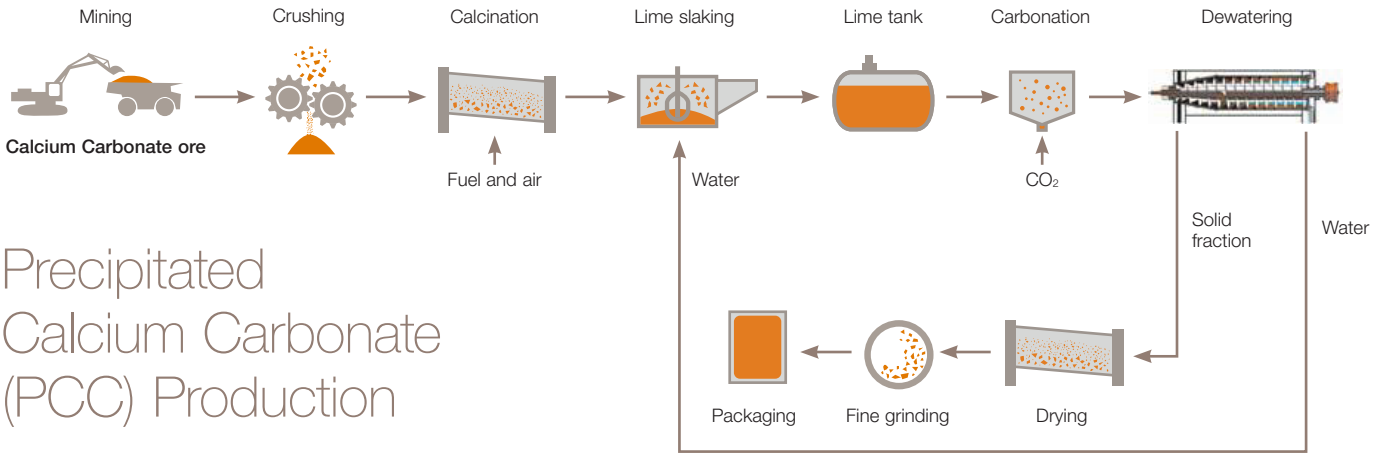
Kaolin is often described as primary or secondary kaolin deposits, which define the number of particles smaller than two microns. This makes the classification step very important, as it can be the driving force behind quality differentiations based on particle size and distribution. The degritting process before the classification step is important if small amounts of sand are present.

Advantages for all processes and requirements

A decanter offers a number of benefits, regardless of which calcium carbonate production method is used or whether classification or dewatering is required. Decanter process parameters such as bowl speed, pond level settings and differential speed can be used to classify the product and particle sizes deviating from a certain diameter can be excluded.

Kaolin Production





Precipitated Calcium Carbonate (PCC) Production

Kaolin production, like calcium carbonate production, requires a final dewatering in order to minimize the cost for final drying of the product. Consequently, the process benefits are similar to those of decanter installations in calcium carbonate applications.

The product can be dewatered to a higher dryness, minimizing the cost in the drying process, which is often an energy-intensive process.

Efficient protection and high reliability

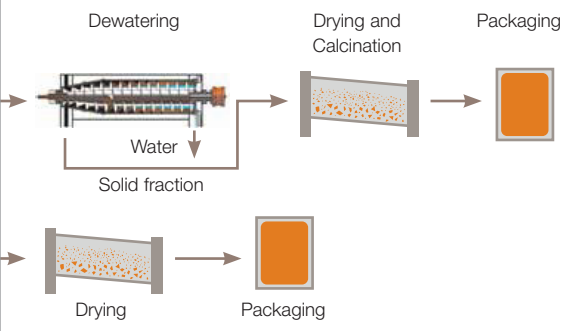
With more than 100 years of experience, Alfa Laval brings you cleaner and more efficient solid-liquid separation. Our accumulated expertise in industrial minerals separation means we can provide you with an optimized design for your application.

Besides a unique bowl geometry and an inlet zone to ensure gentle acceleration of the slurry, we can offer higher grade materials to protect the bowl and conveyor. We can also offer economical options for less aggressive, less erosive slurries if this is a priority.

No matter what the solution, all the critical parts we provide are made of wear and corrosion-resistant material. There are also options to include tiles that provide extra conveyor protection, or cleaning-in-place (CIP) programs especially adapted to the specific application.

Key benefits:

- A solid fraction with low water content means lower drying costs
- High flexibility – decanters can be applied in classification and dewatering
- Lower power consumption than competing separation technologies such as plate-and-frame filters
- Unmatched separation efficiency facilitated by our special deep-pond technology
- Small installation space – the largest capacity per installed area
- Continuous, automatic operation instead of batch operation
- Enclosed process means a greatly improved working environment.



Samples from a dewatering test on calcium carbonate. The inlet slurry (left) is separated into the solids fraction (middle) and liquid fraction (right) in an Alfa Laval decanter centrifuge. Parameters such as bowl speed, pond level setting and differential speed can be changed in the decanter to meet targets for solid-fraction dryness, particle size and separation efficiency.

Alfa Laval's decanter centrifuges are the perfect choice for treating calcium carbonate, kaolin and other non-metallic minerals slurries.

High torque – low power consumption

Separation is often performed at high solid loads and the minerals are very dense. The backdrive system must produce a high torque as well as a high differential speed to scroll out the dry solids and keep the liquid clean – or, in a classification application, to maintain efficient and exact separation. Alfa Laval's gearbox provides both the required torque and scrolling rate, while also ensuring the lowest possible power consumption.

Automatic control

The 2Touch control system automatically adjusts operation of the decanter according to changing conditions, such as variable flow rates and solids concentration. This guarantees a very dry solids fraction, accurate classification, stable operation and minimum wear and tear.

Maintenance and service

Wherever you are, support from Alfa Laval is never far away. Our worldwide network of sales companies, service organisation and field service engineers are ready to provide assistance, rapid support and ongoing optimization. Our close cooperation with customers in nearly 100 countries is a source of valuable feedback for our research and development team, giving us an edge in the development of market-leading technology.

Design based on experience

Our decanters are designed based on experience, knowledge and testing in laboratory and field environments to optimize your specific processes, setting a framework for scaling up to meet your exact requirements and specifications. Alfa Laval has a wide range of test equipment and resources available to suit the vast range of applications in the mining and mineral industry.

Selected references

Alfa Laval has full-scale references worldwide for different applications and has also carried out extensive testing and laboratory analysis on numerous types of slurry.

Country	Decanter	Year	Application
India	P2-300	2011	Calcium carbonate
India	P2-405	2015	Kaolin
France	P2-500	2009	Calcium carbonate
Malaysia	P2-405	2016	Kaolin

At MS Sawa Clay & Minerals in Rajasthan, northern India, five Alfa Laval decanters are installed in parallel to handle the classification process, separating two-micron particles from coarser material. The customer is very happy with the separation efficiency, and thanks to good communication during the entire engineering of the project, Alfa Laval's design recommendations were adopted to achieve the highest possible process efficiency.

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.