

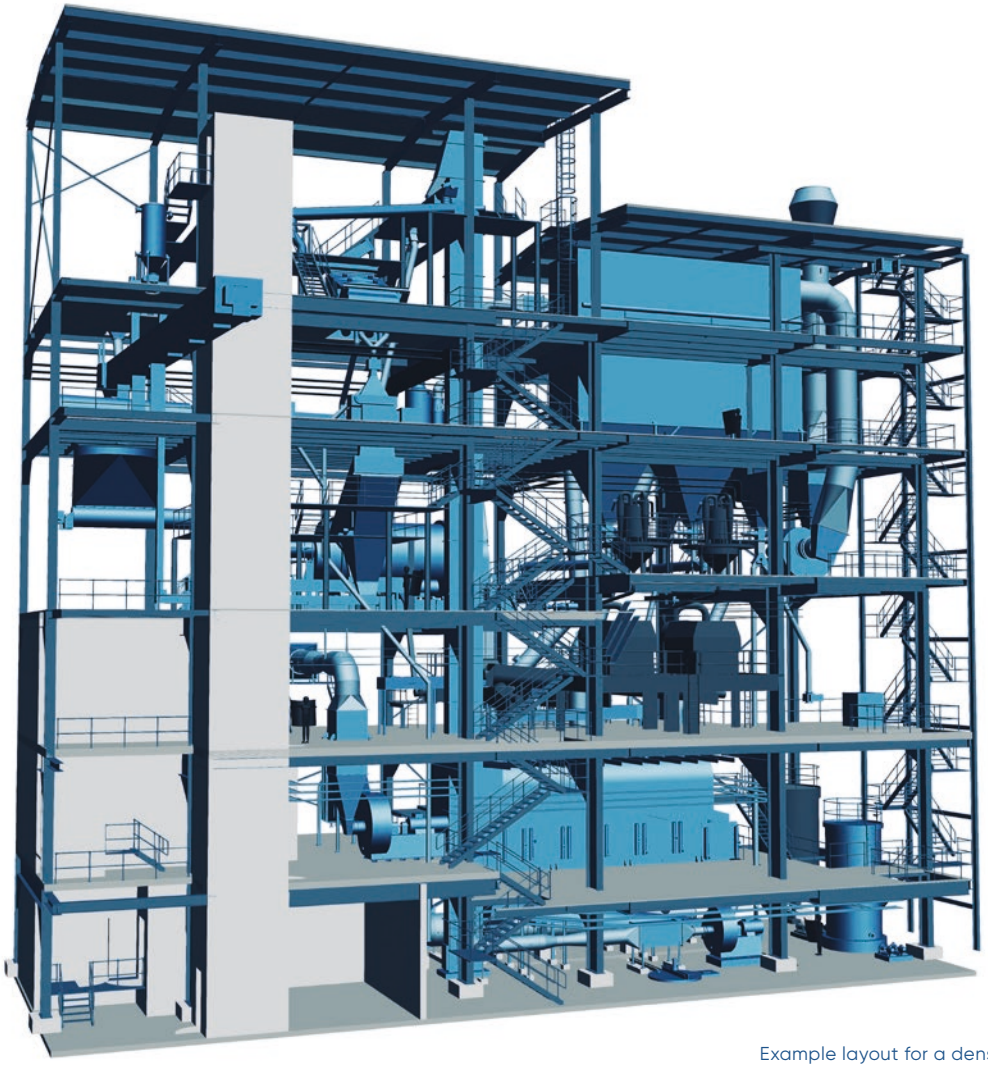
OPTIMIZED DRYING SOLUTIONS FROM LIGHT ASH TO DENSE SODA ASH

Fluidized bed drying and cooling
for the soda ash industry

ANDRITZ

Pioneering drying technology for soda ash plants

As the leader in technology development for efficient drying of bulk solids, ANDRITZ was the first company to introduce fluid bed technology with internal heat exchanger for numerous applications in the chemical and minerals industries. And this also applies to one key application in the soda ash industry – drying of sodium carbonate monohydrate from the Solvay soda process to produce dense soda ash. The first fluid bed process of this type for a soda ash plant was engineered and built by ANDRITZ in 1986. Since then, ANDRITZ has continued to support producers of dense soda ash in achieving their targets – in terms of process reliability and product quality.



Example layout for a dense soda ash system utilizing fluid bed technology

Dense soda ash for the glass manufacturing industry

Customers have specific requirements concerning the quality of soda ash. The glass industry, one of the major consumers of soda ash, prefers dense soda ash as it has certain properties that are beneficial in glass manufacturing. As a fluxing agent, it lowers the melting point of the silica used, so the energy required for glass production can be reduced.

In the classic areas of soda ash production, natural resources such as trona deposits are being used increasingly. However, if chemical processes are chosen, the Solvay soda process is the most widespread, and Hou's process as a variation of the Solvay process is also used.

Both processes first produce so-called light ash from thermal decomposition of raw sodium bicarbonate. Light ash is best characterized by small, fragile particles and a low bulk density.

While this product's features fit in certain industries, such as the detergent industry, other industries using soda ash require different particle characteristics. In glass manufacturing, for example, mainly dense soda ash is used. This is due to the following favorable properties.

PARTICLE SIZE

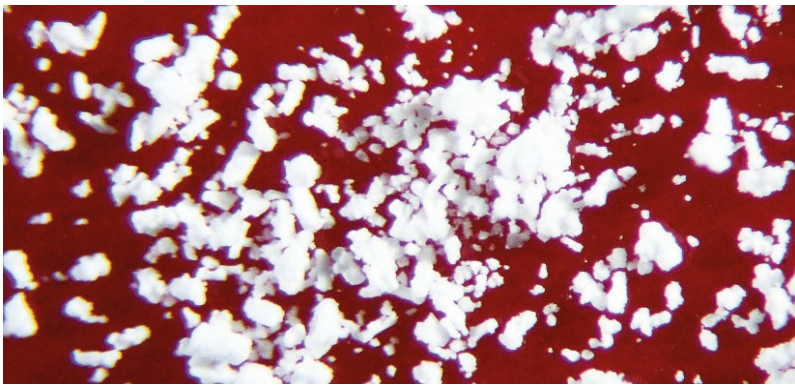
This is especially important because homogeneous mixing of raw materials can be considered the most important aspect of glass manufacturing. In order to produce high-quality glass products, it is crucial that the particle size is uniform and has a defined bulk density. A particle size similar to silica enables good blending with the other raw materials. The higher the similarity of the particle size and bulk density to the other raw materials, the less demixing will take place.

PARTICLE STRENGTH

In order to minimize dust generation during downstream product handling, it is important to have a solid, abrasion-resistant particle. Abrasion resistance can be enhanced with a smooth particle surface, which is achieved by imposing certain process conditions inside the dryer that gently remove the crystal water.

LOW FINES CONTENT

The reduction of ash fines is another important aspect in achieving a homogeneous mixture of silica and soda ash for the glass melting process. Lower soda ash fines content can save money as fewer soda ash fines will be blown off and lost during production. In addition, less dusting and thus easier handling can be achieved.



Light soda ash



Dense soda ash fraction < 1 mm

Customized systems for dense soda ash

Depending on the raw material and process, there are two main ways of obtaining dense soda ash. Both have soda monohydrate crystals as intermediate product but use different methods.

When trona deposits are processed, they end up in a classic crystallizer producing sodium carbonate monohydrate, which is dewatered in filtering centrifuges and then dried inside a fluidized bed. Starting with light soda ash synthesized from salt, limestone, and coal, ANDRITZ additionally offers a hydration system as proprietary equipment that recrystallizes the light soda ash into monohydrate, which is then fed into the fluidized bed via a disintegrator. For the production of dense soda ash, ANDRITZ offers a great variety of engineering solutions. The following process is a typical example of this variety.

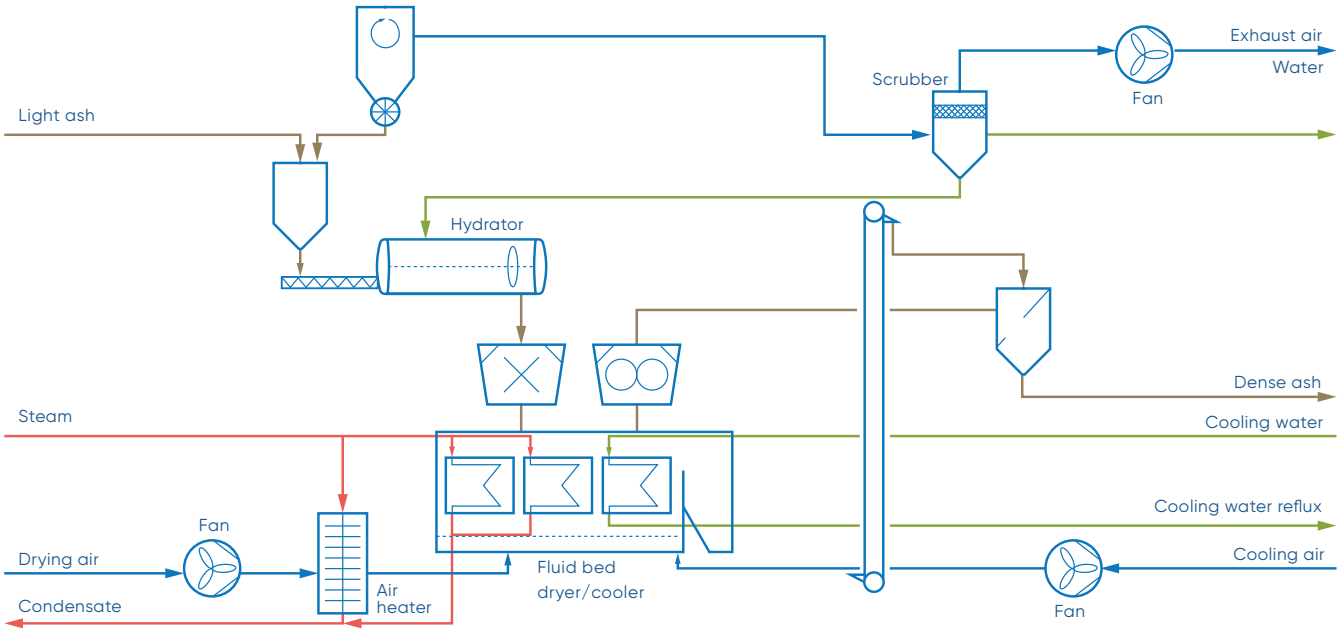
LIGHT SODA ASH HYDRATED TO MONOHYDRATE AND CALCINED TO DENSE SODA ASH

In this process, the hot, light ash reacts with water in the hydrator. The design and construction of the hydration drum as well as the selection of the operating parameters allow, within certain limits, a variation of the particle size distribution in the monohydrate produced and also in the final product.

The weak carbonate solution produced in the scrubber of the dryer/cooler is applied as hydration liquid and thus is reused. The wet monohydrate particles pass through a disintegrator, which reduces large agglomerates, and into the fluid bed dryer. Fines carried over from the dryer are separated in the cyclone and returned to the hydration drum. This results in an almost dust-free, dense soda ash. Coarser particles separated on a simple screen are ground and returned to the fluid bed dryer.

OUTSTANDING FEATURES

- Three process steps in one fluid bed (drying/calcination, cooling, and de-dusting) with no subsequent screening for separation of undersize particles
- Excellent particle hardness thanks to temperature control technology
- Possible process variation to reduce the sodium chloride content of the final product, including additional washing of the monohydrate particles, with subsequent dewatering on filtering centrifuges



Example flow sheet: Light soda ash hydrated to monohydrate and calcined to dense soda ash

EFFICIENT SOLUTIONS FOR THE DRYING AND COOLING OF BICARBONATE

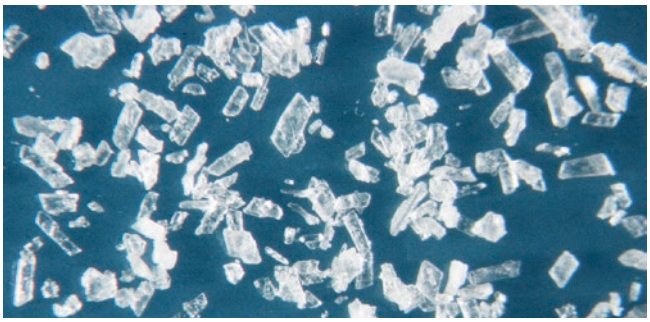
One of the main products associated with soda ash is bicarbonate. ANDRITZ process engineering enables the production of all grades of bicarbonate, ranging from raw to refined, and even to pharma-grade bicarbonate. The fluid bed technology operated in a carbon dioxide atmosphere prevents thermal degradation, so even the highest levels of purity can be achieved. At the same time, the CO_2 atmosphere may even reverse the decomposition of bicarbonate. By using integrated heat exchangers in fluid beds, a higher capacity can be achieved with lower footprint area and lower energy demand.

OUTSTANDING FEATURES

- Gentle drying with minimum decomposition of bicarbonate
- Special solution possible, which can even reverse the decomposition of bicarbonate
- Adequate drying technologies for technical, food, and pharma-grade qualities

PLANT SOLUTIONS FOR A WIDE RANGE OF SODA ASH AND RELATED PRODUCTS

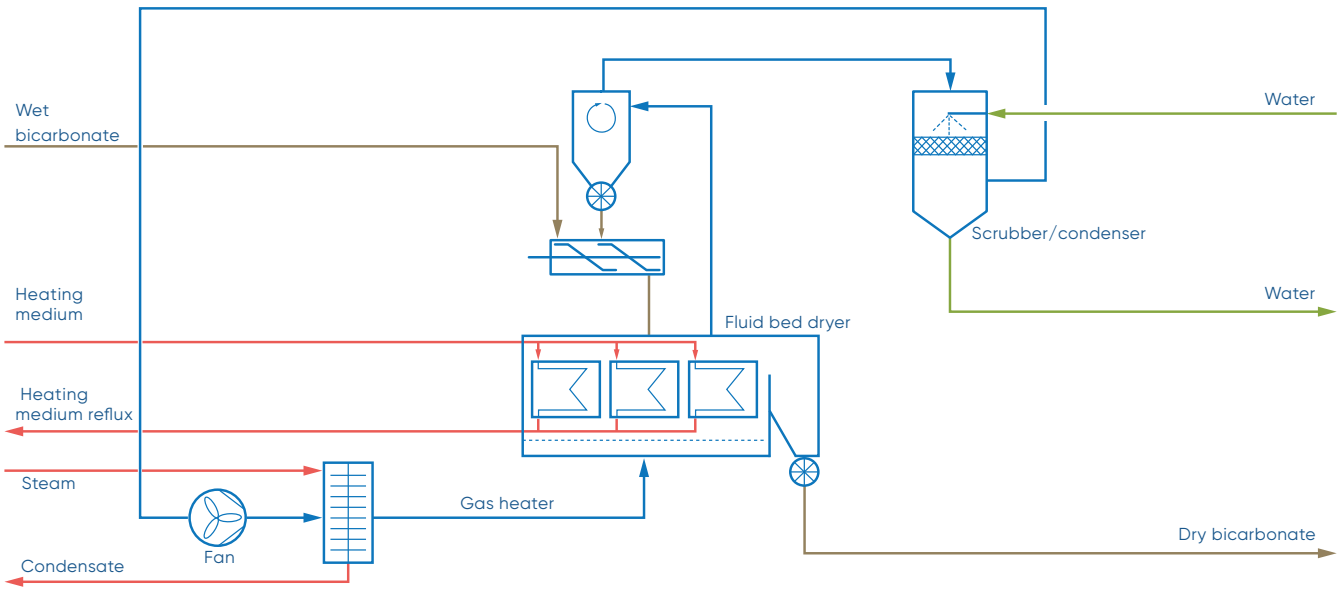
ANDRITZ also offers environmentally friendly solutions for post-drying of calcium chloride dihydrate as well as spray granulation of anhydrous calcium chloride and ammonium chloride, which is generated as a by-product in Hou's process.



Sodium bicarbonate fraction < 0.4 mm

YOUR BENEFITS

- Drying technologies for soda ash and all related products available from ANDRITZ
- Maximum grain size can be adjusted and a low dust content can be obtained in the final product
- Controlled and gentle temperature profile that supports an abrasion-resistant crystal structure
- Different heat sources can be applied
- Different fluid bed types available
- Lab and pilot test facilities to resolve your specific drying challenge
- Process consulting and optimization of existing installations
- Tailored operator training and certification



Example flow sheet: Drying of bicarbonate in a closed carbon dioxide loop

Reliable technology for your peace of mind

SAFETY FIRST

Most of the crystalline products and minerals are inorganic products that require strict environmental and plant safety standards during handling and plant operation. By choosing the right de-dusting system or a closed operation under low vacuum, ANDRITZ meets these requirements. Feasible options for flammable products are a pressure shock-resistant design with relief devices, explosion suppression systems, or inertized drying in closed gas loop systems.

LAB-SCALE AND PILOT TESTING

Our R&D center with its qualified personnel and integrated laboratory is at your dis posal to develop your process or examine your specific tasks. It has capacities for development of components and processes, and for providing product samples (over 2,100 products already tested on lab and pilot scale).



Main services

Our services include development, planning, design, manufacturing, and delivery of single key-components or complete systems, as well as supervising their installation and commissioning.

The right solution for any separation challenge

PEACE OF MIND, COST EFFICIENCY, AND SUSTAINABILITY – ALL FROM ONE TRUSTED PARTNER.

Regardless of your industry – whether environmental, chemicals, mining and minerals, or food and beverage – efficient separation processes are essential for high product quality, reduced waste, and the responsible use of valuable resources. With our advanced technologies, comprehensive services, and smart automation and digitalization solutions, we deliver peace of mind today and lasting success for tomorrow – efficiently, responsibly, and with measurable impact. What's more, with us you also gain access to one of the world's largest OEM manufacturers for solid/liquid separation for well-known brands such as 3Sys Technologies, Bird, Dedert, Delkor Capital Equipment (Pty) Ltd., Escher Wyss dryers, Guinard Centrifugation, KHD Humboldt Wedag, Krauss-Maffei centrifuges, dryers, and filters, LENSER Filtration, Netzsch Filtration, REINEVELD centrifuges, Rittershaus and Blecher, Royal GMF Gouda, Sprout Bauer, and Vandenbroek.

SEPARATION EQUIPMENT AND SYSTEMS

- Decanter and filter centrifuges
- Filter presses
- Dryers
- Presses and screens
- Extractors
- Thickeners
- Evaporators and crystallizers
- Disc and drum filters
- Screening and filtration components
- Specialized thermal systems



FULL-SERVICE OFFERING

- OEM spare and wear parts
- Maintenance and repairs
- Service agreements
- Automation and digitalization
- Machine and process optimization
- Second-hand and rentals

AUTOMATION AND DIGITALIZATION SOLUTIONS

Site assessment and integration • Advanced process control and artificial intelligence • Simulation and training • Digital twin technology • Data analytics and prediction • Electrification, instrumentation and controls

Enabling the green transition

As a technology leader in a changing world, we strive to make a positive impact on our environment. We believe that what we do today can make a difference tomorrow and in the future. We drive change and enable our customers to achieve their sustainability goals and make the world greener with our sustainable solutions in decarbonization, circular economy, renewable energy, and environmental technologies. It all starts with your specific process requirements and ends with a system that gives you the best results – day in and day out, for decades to come.

ANDRITZ. FOR GROWTH THAT MATTERS.

A WORLD OF SEPARATION SOLUTIONS

ANDRITZ provides mechanical and thermal solid/liquid separation technologies, complemented by comprehensive services, automation, and digitalization solutions for the chemicals, environment, food and beverage, as well as mining and minerals industries. Our customized, innovative solutions focus on minimizing resource consumption and maximizing process efficiency, thus making a substantial contribution towards sustainable environmental protection. With over 150 years of experience and more than 2,700 separation specialists around the globe, we are a driving force in the evolution of separation solutions – enabling industries to meet tomorrow's demands responsibly. **ANDRITZ. FOR GROWTH THAT MATTERS.**

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