SEPARATION

PIONEERING DRYING TECHNOLOGY

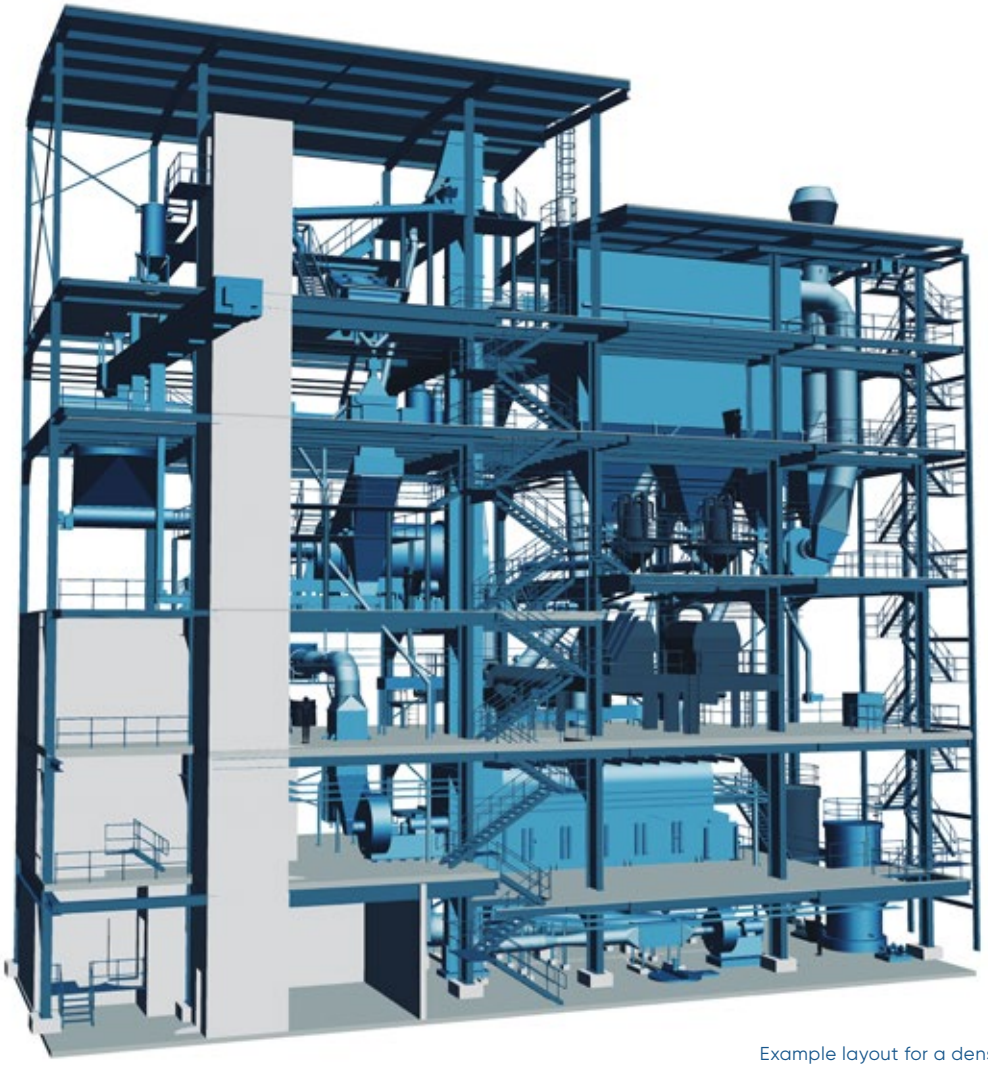
FLUIDIZED BED DRYING AND COOLING FOR THE SODA ASH INDUSTRY

ANDRITZ

ENGINEERED SUCCESS

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

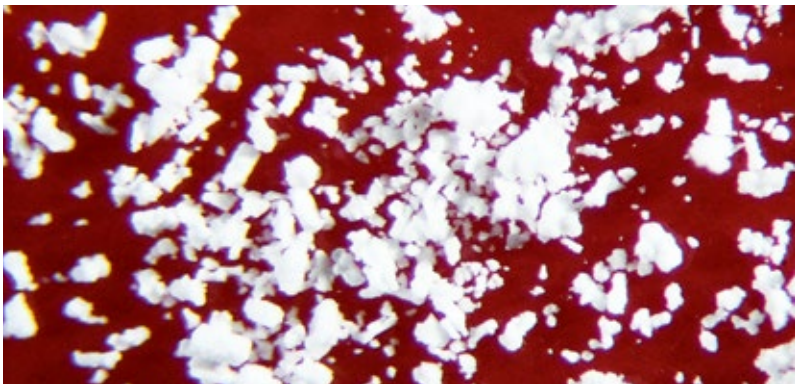
This is especially important because homogeneous mixing of raw materials can be considered the most important aspect of glass manufacturing. In order to produce high-quality glass products, it is crucial that the particle size is uniform and has a defined bulk density. A particle size similar to silica 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

Fluidized bed drying and cooling systems for the production of dense soda ash and related products

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.

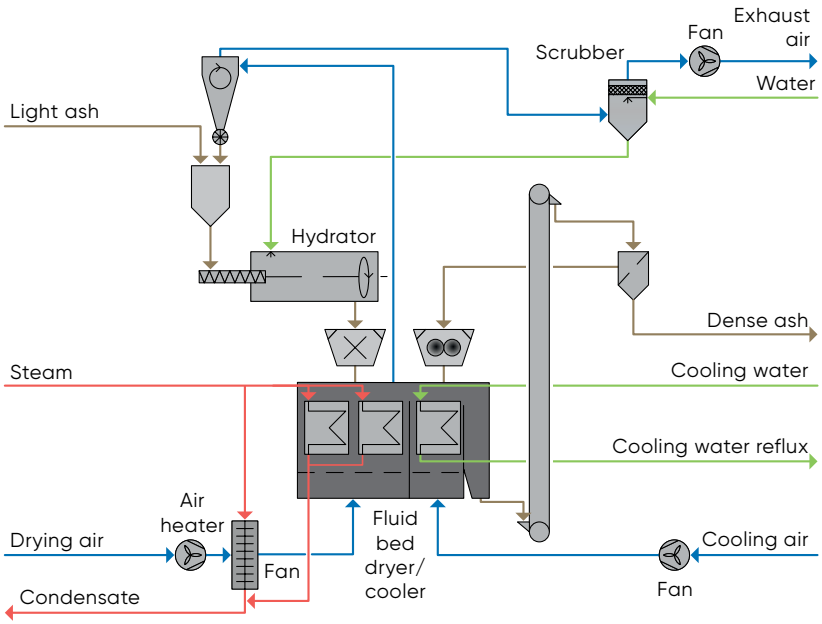
LIGHT SODA ASH HYDRATED TO MONOHYDRATE AND CALCINED TO DENSE SODA ASH

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

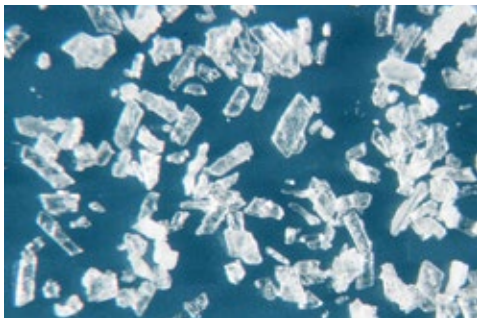


Example flow sheet: Light soda ash hydrated to monohydrate and calcined to dense soda ash

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.

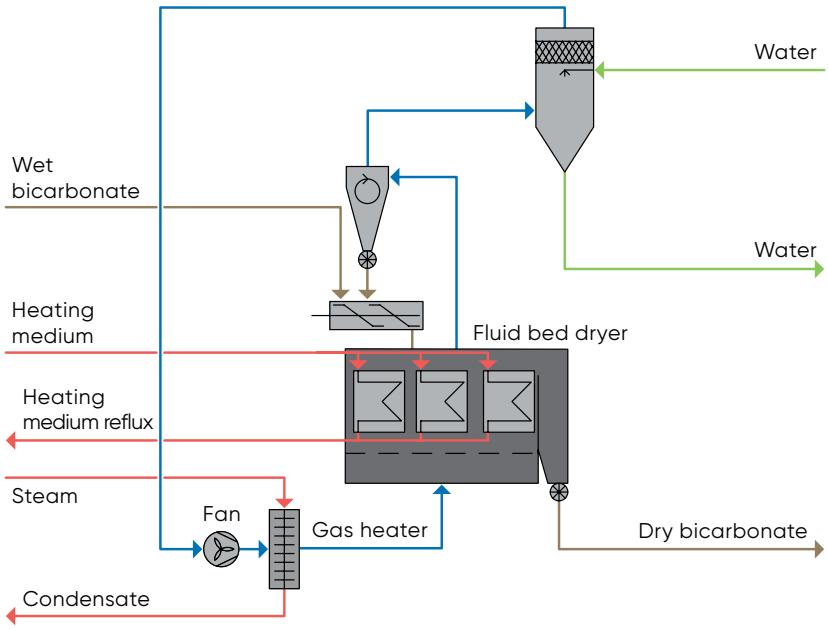
By using integrated heat exchangers in fluid beds, a higher capacity can be achieved with lower footprint area and lower energy demand.



Sodium bicarbonate fraction < 0.4 mm

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



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

YOUR BENEFITS

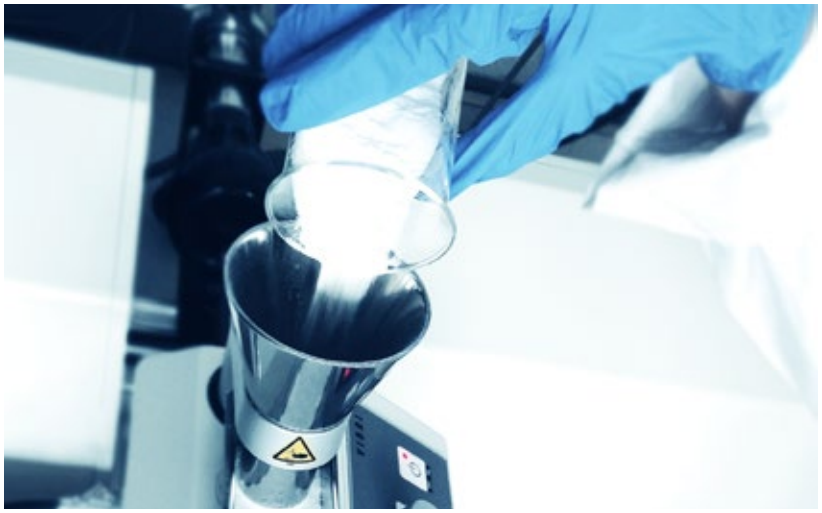
- Drying technologies for soda ash and all related products available from ANDRITZ
- Maximum grain size can be adjusted and a low dust content can be obtained in the final product
- Controlled and gentle temperature profile that supports an abrasion-resistant crystal structure
- Different heat sources 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

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.

Lab-scale and pilot testing

Our R&D center with its qualified personnel and integrated laboratory is at your disposal to develop your process or examine your specific tasks.



Main services

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

Intelligence for machine and process control

Metris addIQ control systems

With Metris addIQ, you get a well-proven, intelligent control solution for industrial processes and machines. Our solid/liquid separation specialists use their in-depth expertise to provide scalable solutions that are individually tailored to regional and application requirements. Whether you're automating new equipment or upgrading to extend the lifecycle of existing systems, we find the ideal solution for you.

Your full-service provider

With ANDRITZ Separation, you gain access to one of the world's largest OEM manufacturers for solid/liquid separation systems, including such well-known brands as 3Sys Technologies, Bird, Delkor Capital Equipment (Pty) Ltd., Escher Wyss dryers, Frautech, Guinard Centrifugation, KHD Humboldt Wedag, Krauss-Maffei centrifuges, dryers, and filters, Lenser, Netzsch Filtration, Rittershaus & Blecher, Royal GMF Gouda, Sprout Bauer, and Vandenbroek.

Whether you need spare parts, rentals, local service, repairs, upgrades, or modernization of your equipment, ANDRITZ Separation is your true full-service provider. From initial consulting through to service agreements, process optimization, and training programs, we are always looking for ways to minimize downtime and increase predictability in operations while raising your overall production efficiency. Wherever you operate, our network of 550 service specialists and global service centers ensures we'll always be there to support you for many life cycles to come. Let's sit down and see how we could take your operations to the next level.

LOCAL SUPPORT
Responsive local service centers and field service technicians

REPAIRS & UPGRADES
Optimization of machine and process performance, repair work, retrofitting, and modernization

SECOND-HAND & RENTALS
Certified second-hand and rental machines

TRAINING
Operator training and tailored seminars for operating and maintenance personnel

OEM SPARE PARTS
Filter cloths, spare and wear parts from OEMs or with OEM level quality, all readily available

SERVICE AGREEMENTS
Preventive maintenance, contracts for spare parts, maintenance, inspections, repairs, upgrades, operation, and equipment monitoring

PROCESS OPTIMIZATION
Automation tools and process expertise to boost your profit

LAB AND ON-SITE TESTS
Lab and testing capabilities for process optimization and machine upgrades

WHAT'S YOUR SEPARATION CHALLENGE?

ANDRITZ Separation is the world's leading separation specialist with the broadest technology portfolio and more than 2,000 specialists in 40 countries. For more than 150 years, we have been a driving force in the evolution of separation solutions and services for industries ranging from environment to food, chemicals, and mining & minerals. As the OEM for many of the world's leading brands, we have the solutions and services to transform your business to meet tomorrow's changing demands – wherever you are and whatever your separation challenge. **Ask your separation specialist!**

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