



# **LEADING THE WAY.**

**PLANTS FOR  
CAUSTIC CONCENTRATION.**

# EXPERTISE FOR THE CHLOR-ALKALI INDUSTRY

## **A leader in the concentration of caustic.**

Whether for the production of caustic lye, or for high concentration and processing into solid caustic soda in various shapes (flakes, prills and pellets) or filling into drums, the expertise of Bertrams Chemical Plants Ltd. plays a significant role in the chlor-alkali industry. Bertrams Chemical Plants Ltd. has set worldwide standards when it comes to the production of highly concentrated caustic soda and caustic pot-ash. Proficiency in chemical engineering ensures high levels of safety and reliability. Bertrams' developments are characterized by specialized knowledge in the handling of corrosive media and high temperatures, and also by the use of high quality standards.

## **Customer-oriented offer portfolio.**

Working in partnership with our customers, we balance all process and economic factors to achieve an optimized solution. Our capabilities range from expert advice and consultancy through engineering and construction of chemical plants – from evaporation units up to product filling and transport systems. The efficiency and profitability of a plant can be secured right from the outset.

## **A prerequisite for project success: the Team.**

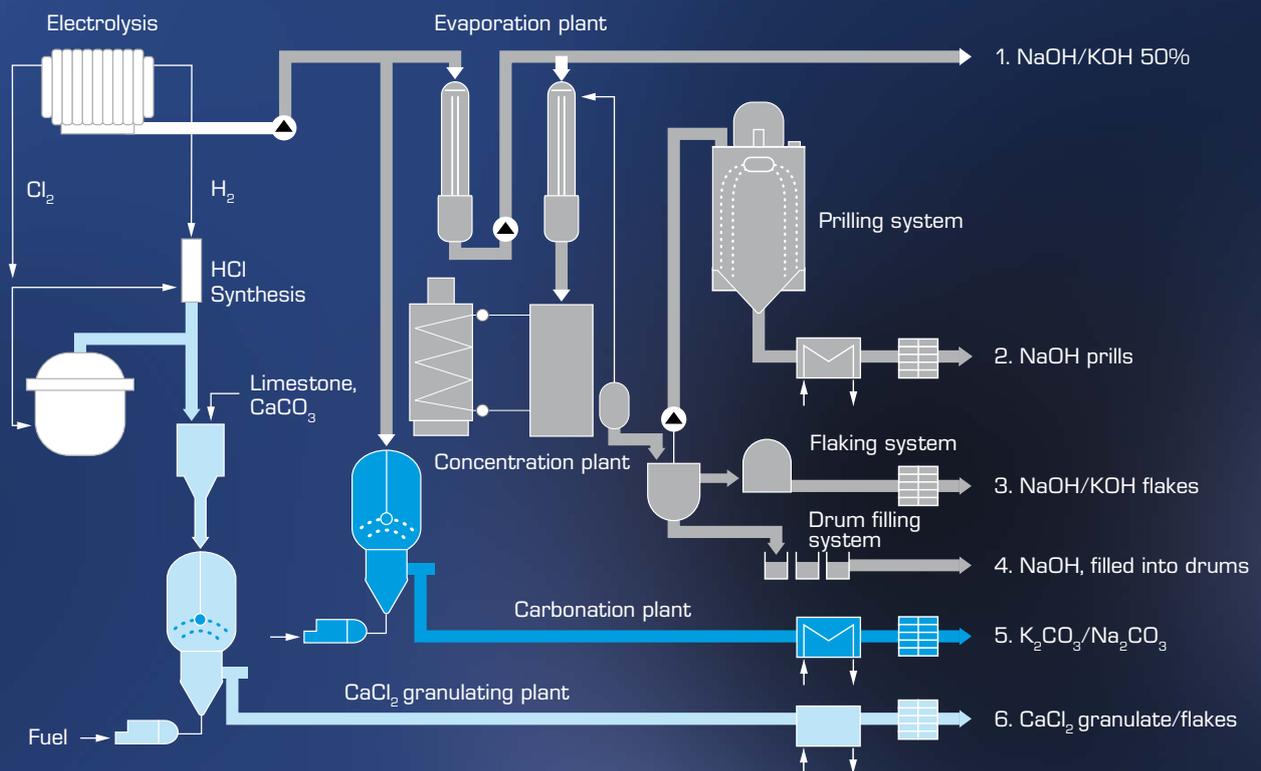
A team consisting of highly qualified and motivated employees is at your service to ensure the success of your project. They avail long years of experience in building successful chemical plants worldwide and are fully aware of the various market requirements.

## **Sharing our success with customers.**

Our comprehensive skills base is at the service of all our customers, including high quality standards and full technical back up throughout the entire service life of our installations.



## CHLOR-ALKALI PROCESS.



■ Not included in the scope of supply



# EVAPORATION PLANTS FOR MEMBRANE ELECTROLYSIS ALKALIS.

## **Solid standards from a reputable company.**

Our references as specialists for corrosive substances and high concentration continue to bring us enquiries in the dilute alkali sector. The evaporation of caustic solution from membrane electrolysis from 32 to 50% has therefore become an established part of our product range for the chlor-alkali industry. It is not so much the exclusive process engineering expertise that is crucial to this mutual success, but more our experience in materials technology. This, combined with an intimate knowledge of the chemical product itself, is also applied successfully in the design and construction of evaporation plants.

## **Modular system for customized plant design.**

We offer a modular concept to satisfy the demand for evaporation systems for caustic solutions from membrane electrolysis, strictly oriented to cost-effective factors. On the basis of few parameters specified by the customer, we can design the most profitable system for a given duty. The whole range of standard systems is available: from standard plants with basic engineering only, right through to complete skid-mounted or turnkey systems.

Whether a basic system or full version, what counts is the high plant availability, operational reliability and long service life of every alkali plant from Bertrams Chemical Plants Ltd.



**Standardization minimizes investment and operating costs.**

Evaporation plants, typically designed as one to four-stage concentration process, are used to concentrate caustic lye and caustic potash to 50%. Characterized by their extremely high reliability, the operation of these caustic evaporators is based on the falling-film principle. In order to design a system optimally suited to meet customer needs while at the same time reducing investment and operating costs, Bertrams Chemical Plants Ltd. has introduced a systematic standardization concept for evaporator systems.

**The falling-film evaporator**, the key component in the entire system, has a defined optimum tube length which is well proven in industrial practice, but the shell diameter can be selected from a total of 14 standard sizes. This makes it easier to adjust plant capacity to match the customer's specifications. The vapour separator, which forms an integrated part of the system as it is directly joined to the shell, also has standardized dimensions but can be combined at will with any size of calandria. It is also worth mentioning that the maximum use is made of the process vapour as heating medium in order to boost overall energy efficiency. In addition to multiple-effect configurations, vapour is also used for interstage preheating, thus minimizing the consumption of live steam for the complete process.

To increase the plant availability, preheating of the caustic solution takes place in a tube bundle or in a Becorex heat exchanger (Bertrams Coil Exchanger) in order to avoid the use of gasketed plate heat exchangers at higher temperatures, due to their poor reliability.

Last but not least, Bertrams Chemical Plants Ltd. has optimized the layout concept of evaporation plants to construct more compact plants using modular methods. Thus significant reductions in the investment costs for the entire project can be achieved to the benefit of the customer.

**Customer parameters determine the plant configuration.**

The requirements for an evaporation system will depend on the parameters specified by the customer. The modular design system concept developed by Bertrams Chemical Plants Ltd. is therefore an ideal basis for producing customized designs. Scaling up the basic design to meet local requirements is then easily achievable. The successful use of nickel components for such evaporation processes forms the basis for this. The use of nickel and other corrosion resistant materials represents state of the art practice in the concentration of caustic solutions today.



- Concentrations from 32% wt to 50% wt
- For NaOH or KOH solutions
- Output: 10-2,500 tonnes per day as 100% NaOH
- 1 to 4-stage plant
- Falling-film technology
- > 200 reference plants worldwide

**Proven technology.**

Right from the construction of the first plant in 1987 up to the supply of more than 200 evaporation plants since then, Bertrams Chemical Plants Ltd., in collaboration with the caustic producers, has continuously developed new proposals for increased production at lower costs and environmental impact.

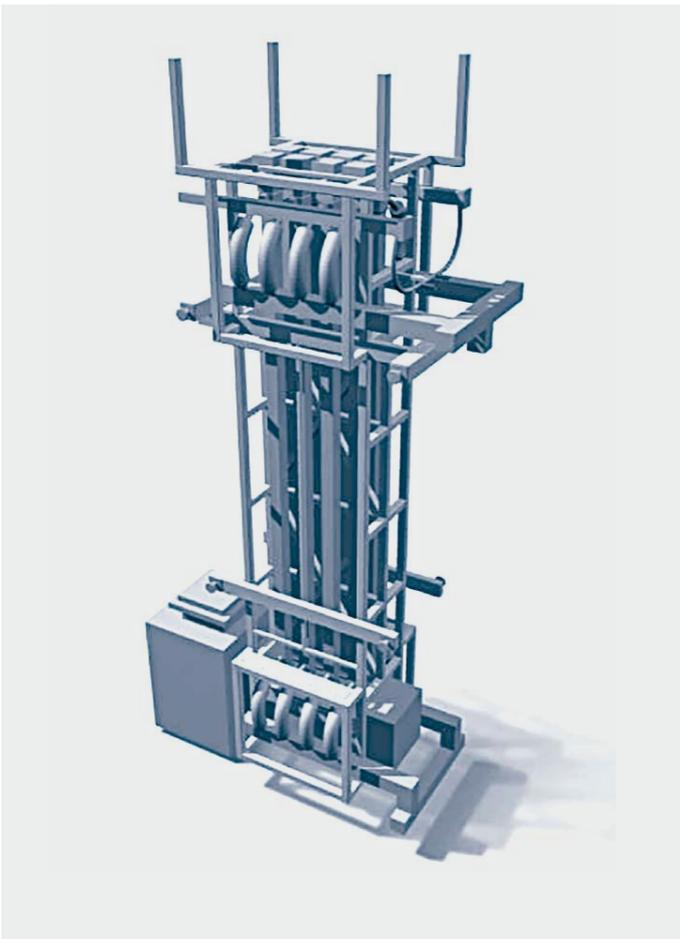
# HIGH CONCENTRATION PLANTS.

## **Caustic potash to 95%, caustic soda to 99.5%.**

Systems producing caustic soda with a final concentration of 98–99.5% have great importance in the international chemical industry, but the markets for potassium hydroxide also benefit from the comprehensive expertise of our engineers. Caustic potash, which we concentrate up to 90–95%, is mainly produced in the form of flakes. For special requirements and laboratory applications however, we can also offer NaOH and KOH in pellet form.

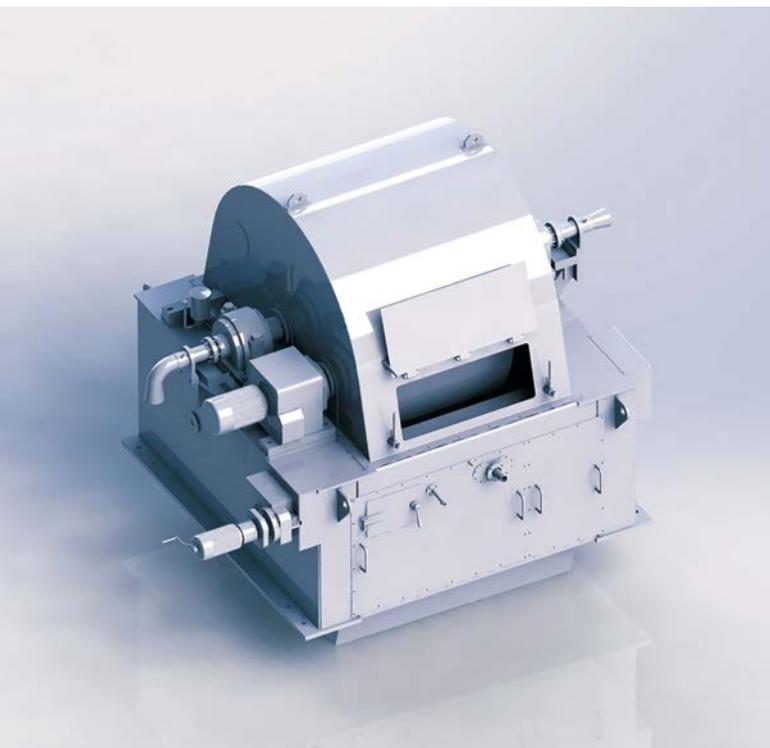
## **Continuously at the leading edge.**

Our specialized manufacturing expertise guarantees robustness, reliability and efficiency in every Bertrams plant. Our high concentrator is not conceived as a single tube bundle, but consists of several concentrator elements assembled in a modular design. This offers significant advantages in terms of service life and in operation since each concentrator tube can be individually and easily replaced. The concentrator elements are made out of pure nickel. Expansion bellows for stress compensation and indirect heating for maximum operational reliability are additional examples of the application of our manufacturing know-how.





# FLAKING AND PRILLING UNITS.



## **Proven technology inspires confidence.**

The basic concept for our particularly robust and compact flakers has a very good track record in industrial practice. Some of the essential features of our flaker are the production of “cold flakes” in one stage, the possible adjustment of the blades from the outside during operation and, last but not least, the possibility of complete drainage for cleaning and maintenance purposes. Steady temperature conditions in the flaker’s closed cooling water circuit ensure a final product with constant properties – a feature which is highly regarded by our customers in the most diverse climatic zones.

- **Output: 20–120 tonnes per day as 100% NaOH/KOH**
- **Suitable for 99% NaOH or 90–95% KOH flakes**
- **Flake temperature: max. 60°C**





- **Output: 150 to 450 tonnes per day as 100% NaOH/KOH**
- **Dust-free product**
- **Prill size: 0.1–1.3 mm ( $d_{50} = 0.7$  mm)**

#### **Prills set the trend for easy-to-handle alkalis.**

Our development of a dust-free product in a free-flowing form redefined the market for solid alkali products. Today the worldwide production capacity for this product form represents a significant market share. The special materials and processes involved in prilling systems are well worth the comparatively high investment costs incurred initially. The advantages are plain to see: there is no product wastage in storage and handling, as the tiny pearls can be accurately metered to the nearest gram; they can be stored in silos and bags, or filled into containers with no tendency to form lumps or generate dust. Prills are suitable for universal use, but especially where caustic soda is mixed with other granulates: for example, in the manufacture of detergents and washing agents.

#### **Joining forces with carbonate plants.**

Our carbonate plants are a successful solution in the production processes for special glass. We use the fluid bed process to produce anhydrous, dust free soda and potash as a manageable granular with a high bulk density. Substantial synergies arise for our customers when carbonate systems are combined with flaking or prilling plants.

# SPECIAL PRODUCTS.

## **Calcium chloride production plants.**

In sodium chloride (NaCl) electrolysis plants built primarily for the production of NaOH or KOH solution and having no use for the resulting chlorine, the CaCl<sub>2</sub> process of Bertrams Chemical Plants Ltd. can be combined with the caustic production plant. In such cases, it can be cost-effective to produce a 35–40% CaCl<sub>2</sub> solution from the reaction of HCl with limestone (CaCO<sub>3</sub>) and then to convert this melt into flakes or granules that are easy to store and transport.

The complete production line begins with the neutralization process and ends after the concentration of the purified 30 to 40% CaCl<sub>2</sub> solution up to 72% with the respective flaking or granulation system. The CaCl<sub>2</sub> solution is concentrated in a single or multi-stage evaporation plant. The CaCl<sub>2</sub> melt is converted into flakes which are then calcined to produce the normal commercial product, which has a concentration of 78–80% or 94–96%. As an alternative, fluidized bed process technology producing a dust-free 94–96% CaCl<sub>2</sub> granule with a high bulk density can be offered. The process gas can be obtained either by burning a low-sulphur or sulphur-free fuel, or by indirect air preheating.

## **Evaporation plants for Na<sub>2</sub>S and NaHS.**

Depending on the manufacturing process, Na<sub>2</sub>S solutions contain components that tend to cause scaling when the solution is concentrated. The Na<sub>2</sub>S/NaHS concentrator supplied by Bertrams Chemical Plants Ltd. is specially designed to cope with this problem. Organic heat transfer medium or steam is used as heating media, with the melt usually being solidified as flakes.

## **Bagging, packaging, palletizing.**

Bertrams offers complete production units for every product form – starting from the concentration process, up to the packaging, palletizing and transport system. Our decades of experience with alkaline products has resulted in offering complete production units, including the packaging and palletizing systems for all product forms. Traditional means of transport such as pipelines for caustic solutions and steel drums for concentrated alkalis are still in demand, but easy-to-handle plastic bags for flakes and prills have long since become the most common means of distribution. The packaging industry offers a variety of bag designs, the type selected depending to some extent on the planned palletizing system. Bertrams supplies electronic gross and net bagging scales for accurate weighing and filling of the product, and recommends semi-automatic or fully automated palletizing systems, depending on the planned throughput and other economic criteria.



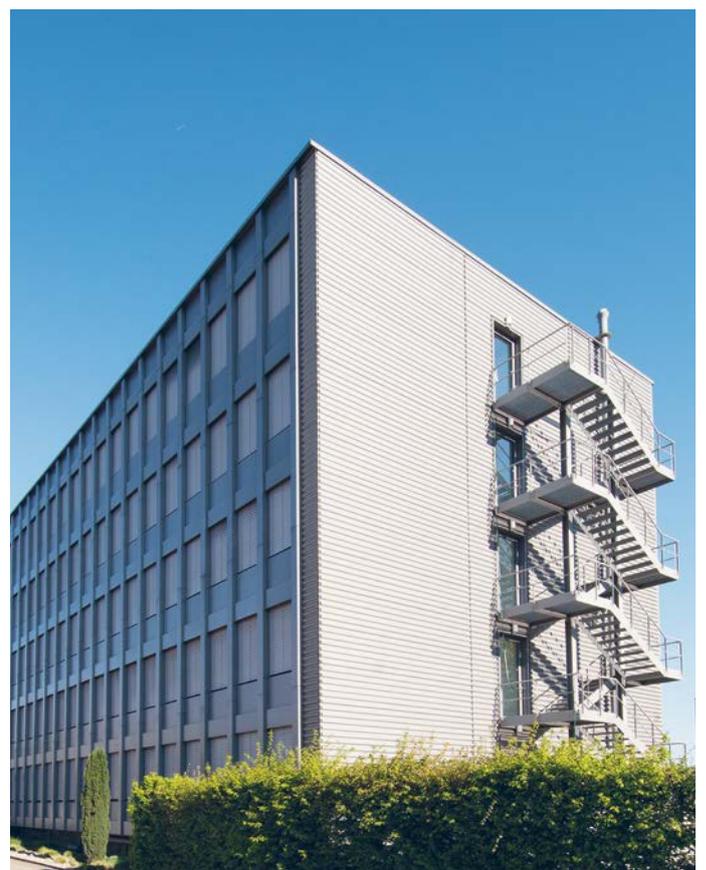
# COMPREHENSIVE RANGE OF SERVICES.

**Right from the very first meeting to sound out ideas you profit from our all-embracing expertise, our quality standards and a comprehensive service program.**

- BASIC ENGINEERING WITH KEY COMPONENTS AND PROCESS GUARANTEE
- DETAIL ENGINEERING
- PROCUREMENT SERVICE
- SKID-MOUNTED SYSTEMS
- TURNKEY PLANTS
- ON-SITE TRAINING
- AFTER-SALES SERVICE
- LONG-TERM GUARANTEE FOR GENUINE SPARE PARTS

## **Constructive relationships with customers.**

The atmosphere of constructive cooperation that we enjoy with our customers results time and again in suggestions being made to improve the efficiency and cost-effectiveness of the plant. If a plant expansion or modification is under discussion, we are also available to help our customers and put forward solutions that are optimized to suit user needs.



**RELIABLE:**

Security and partnership for the most diverse requirements in the chemical industry.

**LEADING THE WAY:**

Plants for the concentration and/or solidification of alkalis in the chlor-alkali industry.

**EFFICIENT:**

Recovery plants for the concentration, purification and treatment of sulphuric acid and nitric acid ( $H_2SO_4/HNO_3$ ).

**COST-EFFECTIVE:**

Wet oxidation units for the treatment of wastewaters that are not readily biodegradable.

**CUSTOMER ORIENTED:**

We sell technology – we deliver satisfaction.

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