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Surfactants

Alcoxylation

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Surfactants Categories

Ballestra is the undisputed leader in process plants for surfactants, providing design, supply and technical assistance at site for process plants for the production of:

- ✓ Anionics (Sulphonation/Sulphation,Vacuum Neutralization, Drying)
- ✓ **Non ionics (Ethoxylation/Propoxylation, Alkanolamides)**
- ✓ Amphoterics and Cationics (Betaines, Esterquats, Aminoxides)

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Non-ionic surfactants (and other species)

Feedstock and products

Process for the production of:

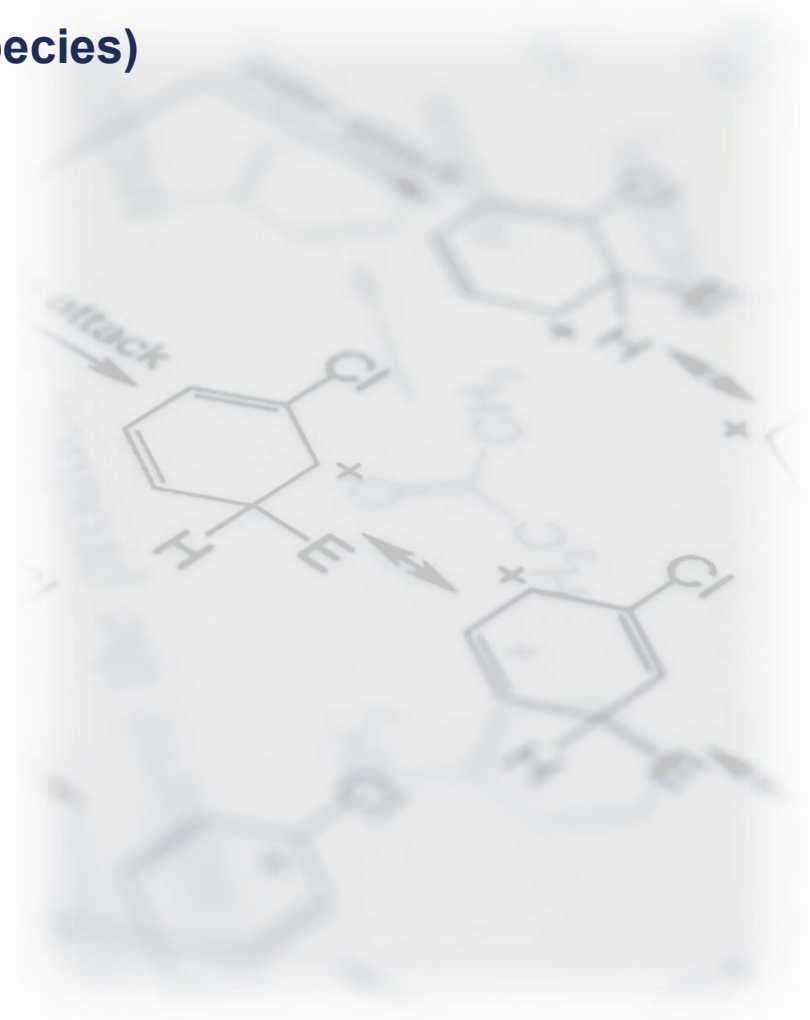
- ✓ Nonionic surfactants
- ✓ Polyethylene glycols
- ✓ Polyether monomers for carboxylate superplasticizers
- ✓ Polyether polyols for polyurethanes

Using the below feedstock:

- ✓ Lauryl Alcohol
- ✓ Sorbitol
- ✓ Fatty amines
- ✓ Fatty acid
- ✓ …

To be reacted with:

- ✓ Ethylene Oxide (EO)
- ✓ Propylene Oxide (PO)



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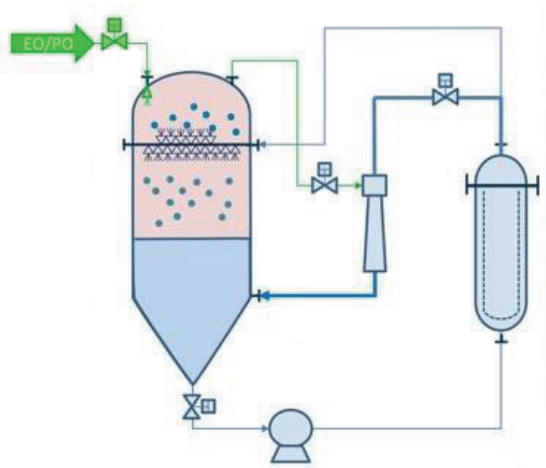
Alkoxylation

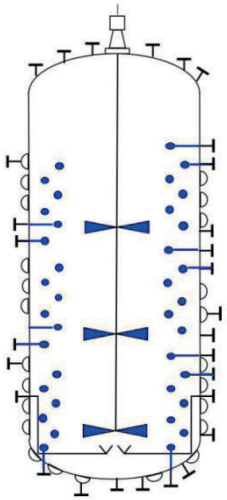
The Ballestra's reactor solutions (1 of 2)

- ✓ Former Pressindustria technology acquired by Ballestra in 2009
- ✓ Highest safety as EO/PO is injected in the gas phase
- ✓ Highest efficiency because of the very high gas/liquid interface
- ✓ Double loop for even better performances



Enhanced Loop Reactor

- ✓ Proprietary design based on hollow shaft to allow better mixing
- ✓ Faster reaction / higher capacity
- ✓ Simple design



Stirred Reactor
(for high viscosity applications)

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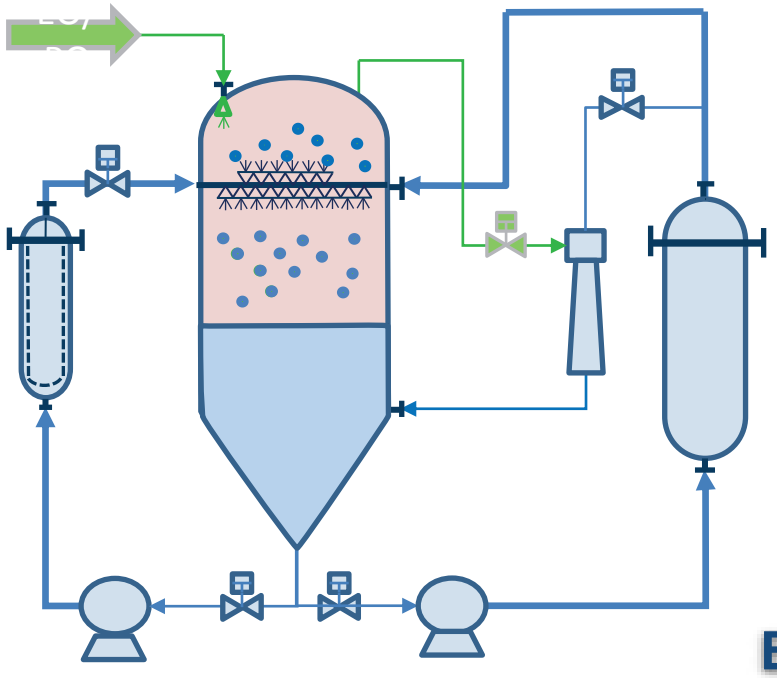
Alkoxylation

The Ballestra's reactor solutions (2 of 2)



Double loop reactor

- ✓ Growth ration up to 65
- ✓ Lower minimum volume for starting the reaction

The reactor configuration (stirred, Enhanced loop single or Anhanced loop double) is selected on the basis of the actual product slate required by Customers.

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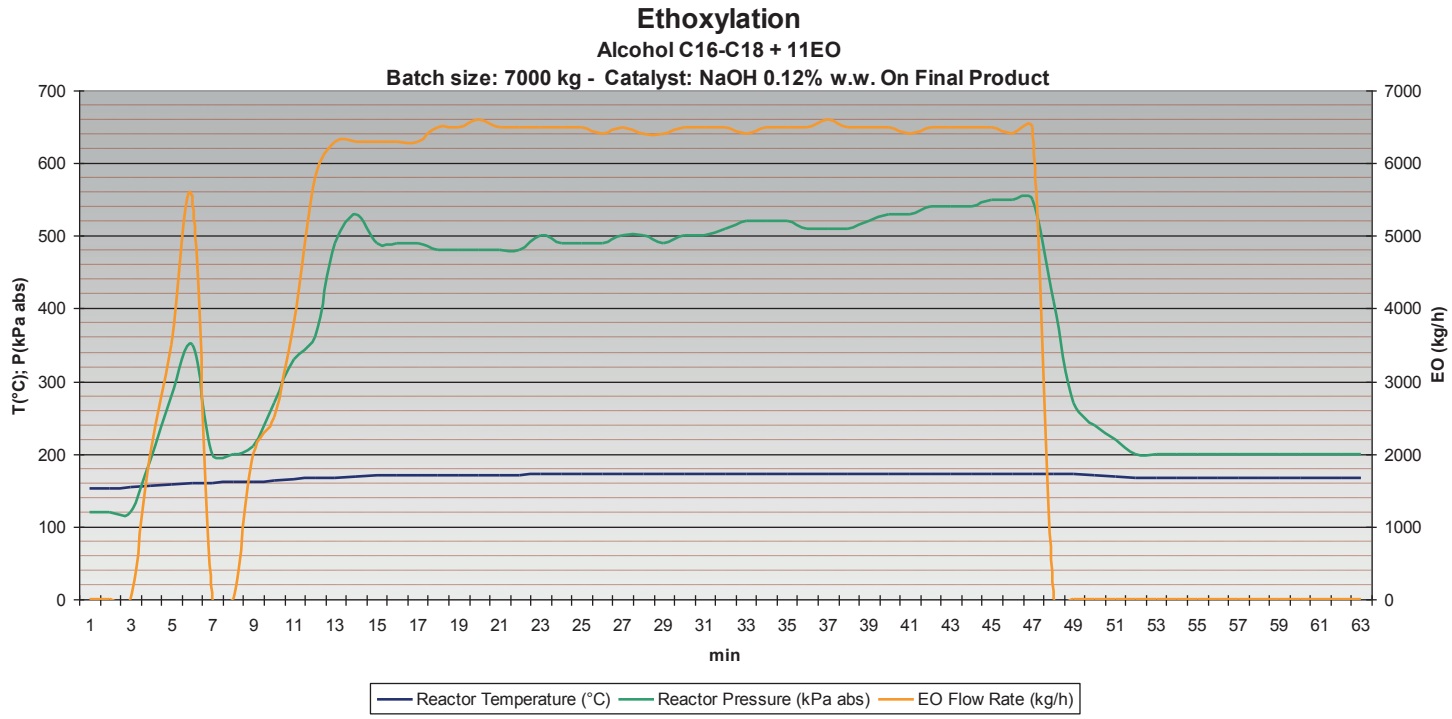
Ballestra Enhanced loop reactor

Reaction Trends



"Ballestra technology ensures very stable temperature and pressure inside the reactor which is a key aspect for the performances and the safety of our units"

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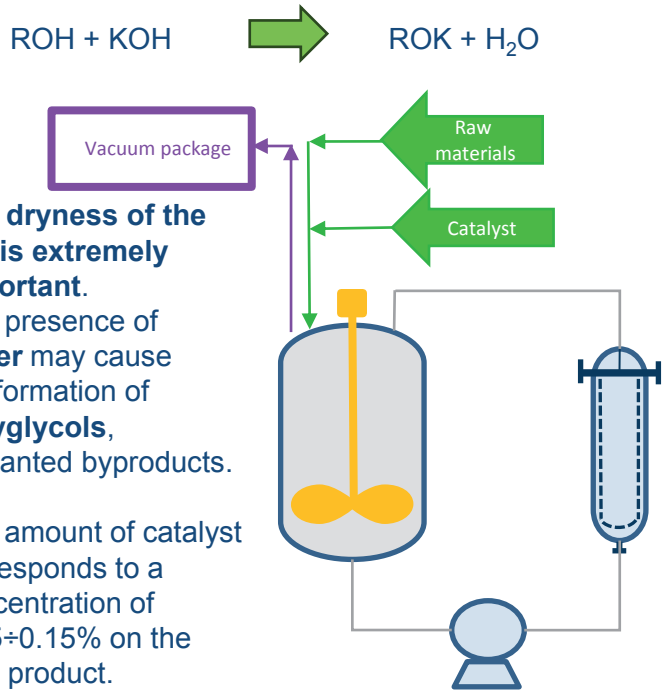
Alkoxylation

Pre-treatments and Post-treatments

Pre-treatment

A dehydration step under vacuum is generally performed to remove the water coming from the catalyst solution and from the formation of the chain starter alcoholate:

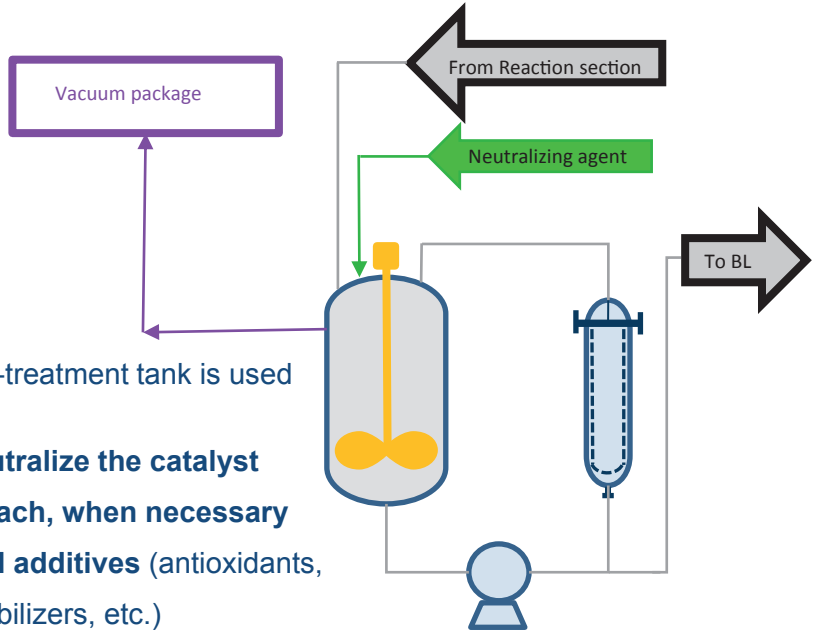


The dryness of the RM is extremely important.
The presence of **water** may cause the formation of **polyglycols**, unwanted byproducts.

The amount of catalyst corresponds to a concentration of 0.05÷0.15% on the final product.

Post-treatment

The post-treatment section is constituted by a **stirred tank** able to operate at atmospheric pressure or under vacuum, provided with an external recirculation on which is installed a heat exchanger for cooling down the product, received from the reactor, at the neutralization/discharge temperature.



The post-treatment tank is used to:

- ✓ **neutralize the catalyst**
- ✓ **bleach, when necessary**
- ✓ **add additives** (antioxidants, stabilizers, etc.)

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Ballestra loop reactor based solution

Safety first

"Enhanced Loop Reactor" technology is characterized by inherent safety features which renders hazardous conditions very unlikely"

- ✓ No rotating or moving parts in contact with the alkylene oxides in the gaseous phase, thereby avoiding the risk of hot spots or electrostatic charges formation
- ✓ Alkylene oxides feed in the gaseous phase, excluding any possibility of the extremely dangerous backflow of catalyzed liquid in ethylene and propylene oxide storage tanks, even if the protective systems preventing the backflow aren't operating or are misoperating
- ✓ Continuously washed gaseous phase and fully wetted reactor walls in order to avoid oxides accumulation in the vapour phase as well as the formation of hot spots
- ✓ Designed to withstand the unlikely case of an explosion inside the reactor

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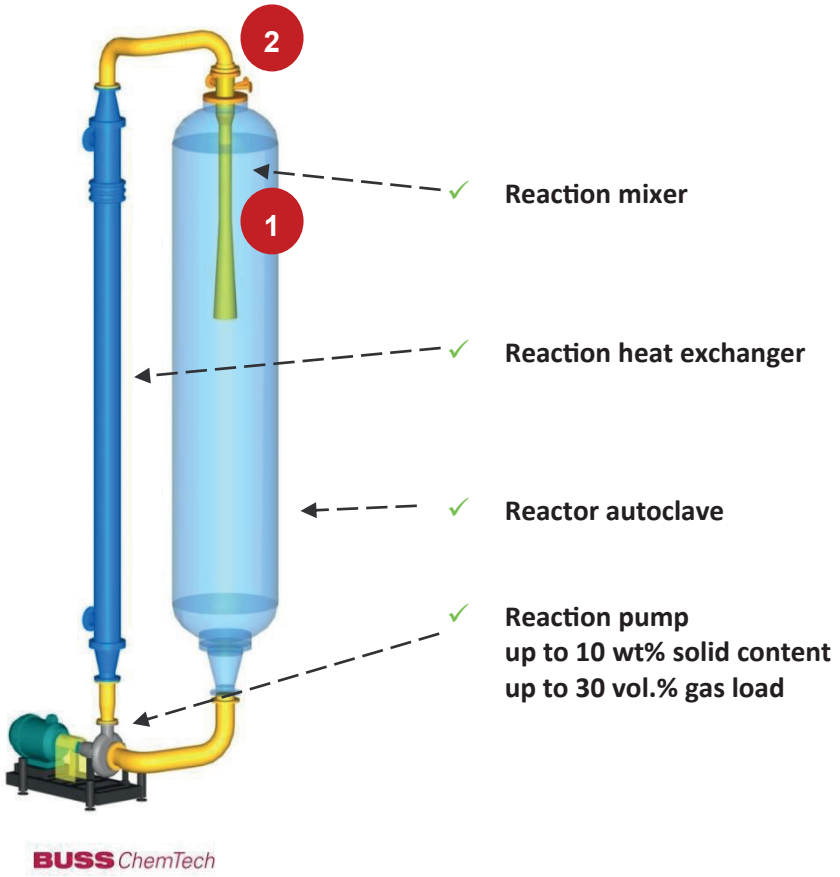
Buss Loop reactor

A Ballestra company solution

It employs an **injector-type mixing nozzle**, based on the Venturi principle, protruding into the top part of the reactor.

The EO is pumped and metered directly into the suction chamber of the Reaction Mixer .

The pumped liquid passes through a nozzle that provides a high velocity jet of fluid to create mixing of EO/PO with the reacting liquid.



"The combination of Buss Chem Tech technology, part of Ballestra group, and the Ballestra know-how in the Alcoxylation plants further enhances Ballestra's technology portfolio by providing Customers with another option for their project"

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Project Profiles

A "taste" of what we do

Joint venture between PCC SE and PETRONAS Chemicals Group Berhad

Oxyalkylates production plant in Malaysia

- ✓ up to 70,000 metric tons per annum of non-ionic surfactants and polyether polyol.
- ✓ Start-up expected soon.

https://www.pcc.eu/en/joint-venture-between-pcc-se-and-petronas-chemicals-group-berhad-commences-construction-of-new-oxyalkylates-production-plant-in-malaysia/

Alcoxylation plant 100,000 t/y as alcohol ethers, PEG and polyethers for polycarboxylates superplasticizers (China)

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Our Customers

SOLVAY

pcc SE

INEOS

PETRONAS

sasol

Head group

NICCA Activate Your Life

TACG

Nanjing Chemical Material Corp.

ERCA

… and many others all over the world

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