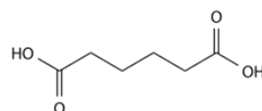




Crystallization of Adipic Acid



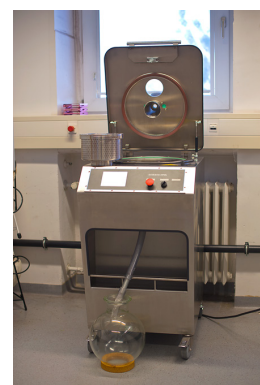
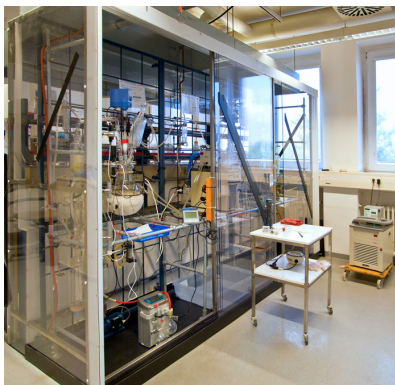
Adipic acid is an example of di-carboxylic acids coming from fermentation upstream process. Adipic acid is one of the most important dicarboxylic acids. It is mainly used as a precursor for the Nylon production.

GEA Messo PT has developed and constructed plants for the crystallization of Adipic acid for more than 50 years. Our design concepts are various and to be tailor-made for each plants regarding product qualities, energy and economic efficiency.

Our related products:

- Benzoic acid and its salts
- Salicylic acid
- Ascorbic acid
- Fumaric acid and salts
- Tartaric acid
- Malic acid and salts
- Citric acid and salts

Thanks to our wide range of in-house test facilities, we are able to study and simulate the design concept for each products as the basis for the full-scale plant to come up with the most optimal solutions of the overall plant starting from the crystallization, separation until product handlings.



Process Description

Here, the design criteria is the energy efficiency of the plant. Therefore, multiple stages of flash cooling crystallizers operating at different pressures are chosen. Draft tube crystallizers are selected regarding the economic point of view.

The adipic acid from the upstream process is fed (1) into the first crystallization unit (2). Due to temperature and pressure differences between the incoming feed solution and the suspension in the crystallizer, vapors are flashed out leading to the crystal formation of adipic acid.

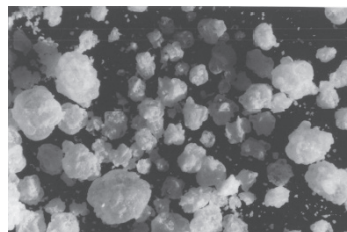
At this crystallization stage, a baffle is needed to provide the optimal suspension density for the operation of the crystallizer by collecting the crystals grow at the bottom of the crystallizers. Therefore, the incrustation of the crystals on the surface of the crystallizer can be avoided. The crystal slurries from this unit are then brought to the second crystallizer (3). The pressure of this crystallizer is set to be lower than (2) in order to induce flashing out of vapor resulting in further crystallization of adipic acid. In other words, yield of adipic acid is enhanced by this crystallizer unit.

Flash vapors generated in (2) and (3) are condensed by the surface condensers (9, 10) which are equipped with the vacuum station (13).

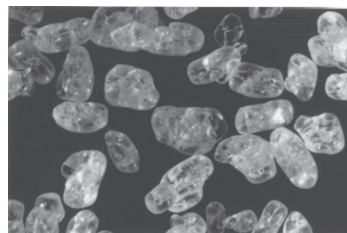
The crystal slurries from (3) is then withdrawn (4) to the separation units (5, 6) to obtain wet crystals of adipic acid. Purities of adipic acid can be enhanced by washing the crystals in the centrifuge.

Special features of this plant

- Long operating cycles
- Good final crystal size distribution
- with d50 of 200 µm
- High product purities
- Good plant flexibility and stability



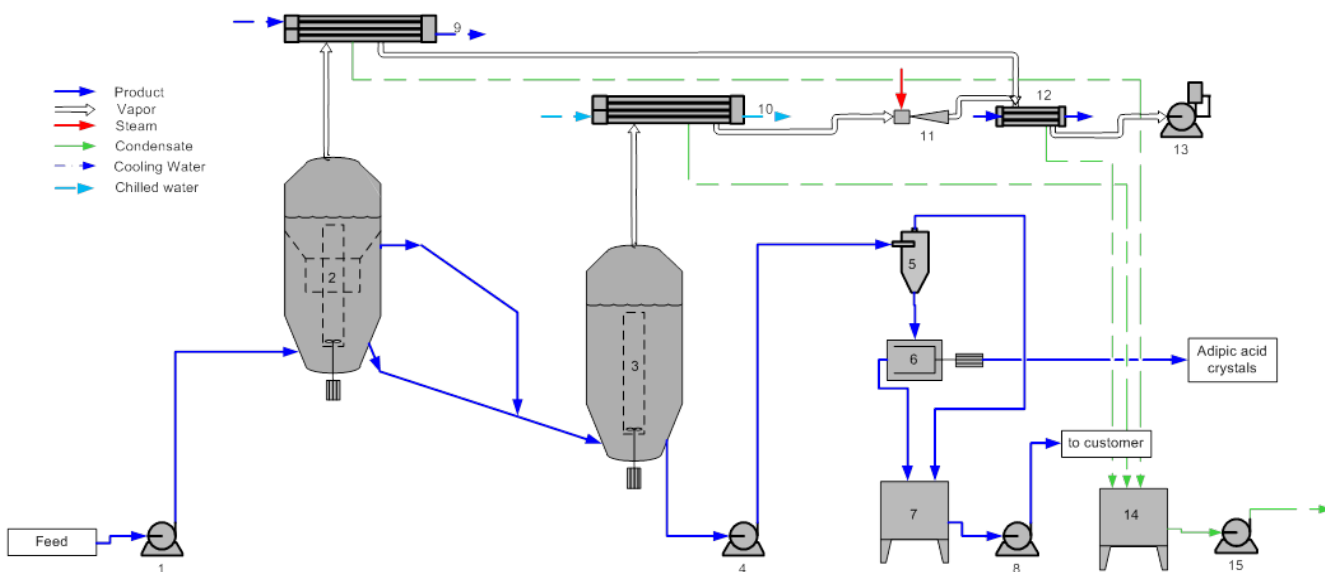
Crystals of adipic acid crude products



Crystals of adipic acid purified products

This concept has already been implemented successfully several times. The capacity of the largest plant is so far in the range of 120 t/h feed solution with the adipic crystals of about 12,500 kg/h production capacity.

In many cases, the concept for crystallization plant of adipic acid is extended to further purify the adipic crystals by means of recrystallization which can be done in the similar way as the process described.



Next Steps

For more information regarding this technology and your specific configuration requirements, please contact us at: info.geamesso.de@gea.com or phone +49 2065 903-0.

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