

# Falling film melt crystallization – Technology for production of glacial acrylic acid

Do you need to increase the purity level of the acrylic acid you manufacture?

Sulzer can help you with its fractional crystallization solution for high-purity applications.

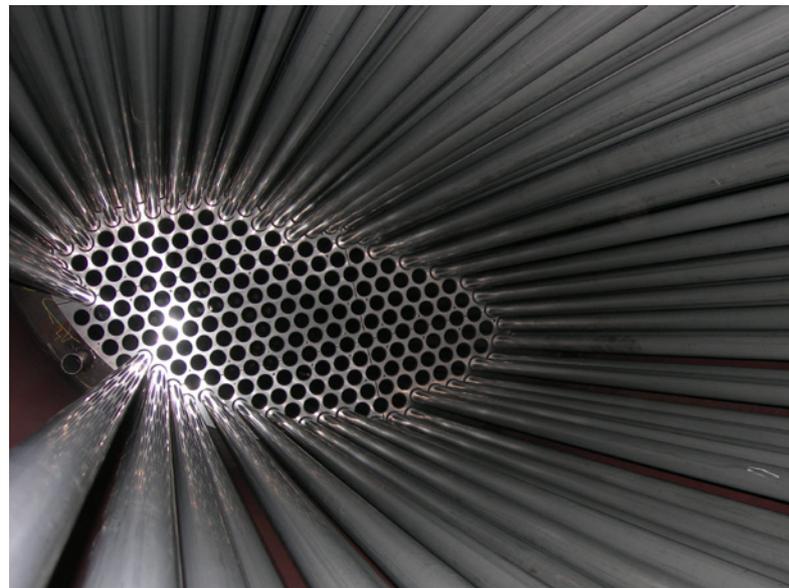
Acrylic acid monomers are used for a wide variety of industrial applications, such as adhesives for the construction industry and copolymers for coating applications in the wood, textile and paint industries.

High purity glacial acrylic acid serves as monomer for Superabsorbent Polymers (SAP), which are widely used for baby diapers and personal care products. These applications require over 99.9% purity acrylic acid, and often this requirement will rise to 99.99%.

When the distillation of acrylic acid cannot further purify the chemical due to the risk of polymerization, crystallization comes into play and can remove any remaining impurities at low process temperatures without posing a hazard to plant operators.

Sulzer Chemtech offers proven purification equipment for thermal-sensitive acrylic acid based on a fast and efficient fractional crystallization method developed by the company itself.

The innovative fractional crystallization system developed by Sulzer Chemtech is based on layer crystallization principles. According to these, crystals of the main substance grow onto a cooled surface, while the impurities remain in the melt. After the crystallization is completed, the remaining impure liquid is drained off and the crystals of the pure substance are re-melted.



## Falling film crystallization

The Sulzer approach to layer crystallization resulted in the development of the falling film crystallization system, where the melt is moved in relation to the solid crystals.

The process consists of a collecting tank connected with the crystallizer, which is filled with the acrylic acid melt. The phases of crystallization and melting alternate to separate pure acrylic acid from the residues.

The crystallizer is the most essential part of the falling film equipment. In there, the acrylic acid melt to be concentrated and purified is supplied to the top of the tubes and subsequently flows down the inside of them as a thin film. The acrylic acid starts to crystallize on the tube walls due to external cooling of the tubes, while the rest of the melt, containing impurities, continues to flow down the tubes and reach the collecting vessel. Higher purity levels are achieved by partial melting and removal of the less pure part of the crystal layer.

### Optimal efficiency and flexibility for high-purity output

The use of falling film crystallization for the purification of acrylic acid offers a number of advantages, besides the possibility to obtain high-purity acrylic acid. The system is extremely efficient, as the amount of energy used is much lower than the requirement for a distillation process. In addition, due to the small liquid content present in its tubes, the crystallizer reacts promptly to changes in energy supply to increase or decrease the temperature in the tubes.

The crystallization process also avoids scaling and blockages caused by polymerization. In this way, the service life and reliability of the system is enhanced. This reduction of potential fouling also results in cleaning and maintenance tasks being minimized, reducing plant downtime and maintenance costs.

Finally, the solution developed by Sulzer Chemtech enables flexibility within operations, due to the simplicity of the process itself and the ease of changing between purification phases and cleaning procedures.

### Proven performance

Sulzer Chemtech developed the falling film crystallization technique back in the 1980s and continues to improve its equipment for optimal performance. Currently, falling film crystallization is able to provide a high-yield purification of glacial acrylic acid. Since its first patent, it has been supplying its state-of-the-art solution worldwide for the highly



effective purification of chemicals. This proven industrial process accounts for over 80% of the global volume of glacial acrylic acid.

### A solution for your application

Sulzer Chemtech will offer a tailored solution based on your needs and install the falling film crystallization equipment at your plant. In addition, we will assist you with testing the production process and fine-tuning of the equipment based on your requirements and purification plant design. In this way, we set up the most effective solution for your business.

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