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Кристаллизатор с принудительной кристаллизацией, Кристаллизация из расплава

Технические характеристики



Melt crystallization plant

Suspension melt crystallization the efficient purification alternative

Melt crystallization plants in the chemical industry.

Process description

The typical configuration for a suspension based melt crystallization system is shown in the schematic. Crude product is cooled in scraped surface crystallizers. These may be exchanger type or vessel type crystallizers depending on the specific application. The crystallizer produces pure product crystals and thus concentrates the impurities in the remaining liquid mother liquor. The crystals are then separated from the impurity rich mother liquor producing a pure product stream and a reject stream. The reject contains the concentrated impurities but also valuable product which may be recovered depending on the specific application.

Each individual crystal is suspended in the mother liquor and is allowed to grow free flowing in the liquid. With billions of crystals per cubic meter the growth surface can reach 5,000 to 10,000 m² per m³ of volume. This massive growth surface allows near ideal growth rates that result in the characteristic pure crystals expected from the eutectic crystallization process.

Since all of the impurities are now in the mother liquor it is most important to remove all of this liquid from the outside of the crystals. The crystallizer suspension is pumped into a wash column where the pure crystals are separated and then washed to remove any remaining mother liquor. The efficient washing action provided in the wash column is unmatched by any other solid/liquid separation device. The pure product crystals are then melted and discharged from the system.

Suspension based crystallizers produce pure crystals. Wash columns can effectively remove all of the mother liquor and thereby produce ultra high purity product.

Industrial applications

Capacities ranging from 10 kg/h up to 50,000 kg/h product



Forced Circulation Crystallizers

FC Crystallizers in the chemical industry

The forced circulation crystallizer (FC) is the most common type of crystallizer in the industry

FC Crystallizers

Oxon NaCl FC

The average FC crystallizer evaporates solvent, thus increasing the supersaturation in the process liquor, and causing crystallization to occur. Most conventional FC units operate under vacuum, or at slight super atmospheric pressure.

The FC consists of four basic components: the crystallizer vessel, which provides most of the volume dictated by the residence time requirements, the circulating pump, which provides the mixing energy, the heat exchanger, which supplies energy to the crystallizer (in a typical evaporative crystallization operation), and the vacuum equipment, which handles the vapors generated in the crystallizer. Slurry from the crystallizer vessel is circulated, in plug flow fashion, through the heat exchanger, and returned to the crystallizer vessel again, where its supersaturation is relieved by deposition of material on the crystals present in the slurry. The supersaturation is controlled so as to avoid spontaneous nucleation, by sufficient circulation capacity.

The evaporated solvent is conducted to the vacuum system, where it is condensed and removed.

The FC crystallizer is used for general, simple crystallization operations, where large crystal size is not a requirement. The FC design aims to protect the crystal size from reduction from the crystallizer environment, but has no features to aggressively increase the crystal size.



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