New Whey Processes

With the support of Dairy Australia Limited, The UWS/CSIRO Advanced Separations Technology Group has developed two new technologies for recovery of pure lactose from whey permeate.

The two new patented technologies are known as the Ion Exchange Lactose (IEL) and Accelerated Alcoholic Crystalisation (AAC) processes. These may be used together or separately and have the following advantages.

- May be retrofitted to upgrade an existing dairy processing facility.
- Able to increase the yields of lactose from approximately 65% to 95%.
- Can produce refined edible or pharmaceutical grade lactose, along with potable water and a soluble whey mineral fraction and calcium salt fraction.
- Sweet whey, acid whey or milk permeate may be used as the feed stock.

This novel process generates a pure liquid lactose stream suitable for adding to infant formula; for spray drying into lactose powders for direct compression tabletting; and for faster crystallisation.

The pure lactose stream is also preferred for the manufacture of high value lactose derivatives such as galactooligosaccharides, lactitol, lactulose and for use in nutritional and medical supplements and lactose based biodegradable surfactants.

Technology 1: Ion Exchange Lactose (IEL)
The IEL process has the flexibility to produce all grades of lactose monohydrate from edible to pharmaceutical. It does away with the complicated decolourisation and recrystallisation steps normally required for pharmaceutical grades. It simplifies the crystallisation step and delivers more lactose “in the bag” by eliminating losses and waste streams.
UWS Innovations

Technology 2: Accelerated Alcoholic Crystallisation (AAC)
The AAC technology was originally developed to meet the market need for exceptionally pure pharmaceutical grade lactose with very low levels of minerals and other contaminants.

The unusual rosette shaped crystals give the AAC lactose superior performance in several pharmaceutical applications. The rosette crystals can be tailored to the required size distribution.

AAC lactose has potential application in dry powder inhalers. With their complex microstructure and high surface area to volume ratio, the rosette crystals can carry more active ingredient per unit weight than other forms of lactose and have very good flowability.

The process involves alcoholic crystallisation for controlled lactose particle formation and produces a unique "rosette" shaped, α-lactose monohydrate crystal structure that is free flowing with a narrow particle size distribution.

The process can be further manipulated to produce β-lactose, a highly soluble form of lactose, with good flow and tabletting properties compared to current commercial samples. Significantly, recent studies show that AAC lactose crystals are especially suitable as an inhaler grade lactose.

Commercialisation
The AAC technology has been developed to small pilot scale. UWS and CSIRO are seeking to engage with commercial partners to:

- promote on-licensing of the patented technologies;
- initiate formation of a joint venture or new start-up venture to up-scale and commercialise the process;
- engage in collaborative R&D to extend the technology into new areas.

For more information, please refer to the following website: www.csiro.au/business/AAC-Lactose.html

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