Innovative Ion-Exchange and Adsorber Systems

From fruit to juice
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Bucher Unipektin is the market leader in the development, manufacture and installation of technically sophisticated individual machines and consolidated systems for fruit juice production.

Bucher Unipektin has an international reputation for the depth of staff knowledge and for the high quality of the machinery we construct. All machines exported are built to comply with local regulations including CE for Europe, UL for USA.

Bucher Unipektin – Always There When You Need Us!

These are not empty words. Going the extra mile in the interest of our customers is something which our staff regard as perfectly normal. Global branches and representation offices allow us to adapt to local circumstances and needs as when they arise.

Engineering Capability

Design In-house design team complete all aspects of the equipment design and implementation:
• Process design
• Mechanical design in CAD
• ASME VIII vessel design with independent certification
• Electrical design, CE / UL compliant (or other standard as appropriate)
• PLC-programming and HMI configuration

Construction and Manufacturing
• Multiple trains for continuous operation
• Stainless steel construction throughout, contact surfaces of WNr.1.4435 (ASTM 316L) or as required
• Skid mounted for ease of disassembly, packaging for shipment, and reassembly at customer’s site
• Fully assembled and electrically tested before shipment
• ASME VIII certified vessels
• Built to end user country regulations

Commissioning and Service
• Project engineers travel to site for plant commissioning
• Remote software support is available by modem or internet connection
• Full technical support after sale from engineering, research and development team
Area of Expertise

Bucher Unipektin has the expertise for the development, design, and manufacture of ion-exchange and adsorption polymer based processes for the fruit juice and other food industries.

Other areas of expertise are specialist water treatment applications such as deionisation, nitrate removal and iron removal.

Bucher Unipektin is independent of resin manufacturers, allowing the optimal resin to be chosen for each application.

We will contract research processes specific to individual customer needs.

Applications and Processes

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**Adsorption Process**

In an adsorption process the product is contacted with an adsorbent polymer resin in a fixed bed. The polymer adsorbs the component to be removed by physical interactions (London and van der Waals forces). No components from the resin are released into the product.

When the polymer’s capacity to adsorb is exhausted the product is displaced from the column. The polymer is regenerated and prepared for the next process cycle.

**Ion-Exchange Process**

In an ion-exchange process the product is contacted with ion-exchange resins. Mineral and organic ions in the product are exchanged onto the ion-exchange resin. Cations are exchanged onto cation exchange resin and anions are exchanged onto anion exchange resin.

When the resins capacity to exchange ions is exhausted the product is displaced from the column. The resins are regenerated and prepared for the next process cycle.
Systems for Clear Products

Clarified products are treated in fixed beds. Resin remains in the vessel during the complete processing and resin regeneration cycle. Traces of haze are removed during a fluidising step.

Systems for Cloudy Products

Bucher Unipektin has developed a unique process for treatment of nonfiltered juices containing up to one percent of pulp. Any particles retained in the resin bed during processing are removed by transferring the resin through a unique washing process prior to regeneration. This provides a long and consistent resin service life.

Primarily developed for the treatment of full cloud, low pulp citrus juices this process is now used in a variety of resin processes for hazy or cloudy products.

Both system types can comprise several vessels or trains providing continuous operation and/or treatment with different resins.
**Cloudy Juice Applications**

The cloudy juice systems are mainly used for upgrading citrus juices and by-products, e.g. peel extracts.

The following processes have been successfully developed and commercialised:

- Debittering of orange juice: limonin reduction to below taste threshold (< 5 ppm)
- Bitterness reduction of grapefruit (reduction of naringin)
- Debittering and astringency reduction for flavour enhancement of citrus peel extracts and whole fruit comminutes.
- Debittering of WESOS
- Acid reduction or ratio adjustment
- Reduction of browning in lemon juice
- Debittering of tropical juices, such as Mango

Feed material to be pulp reduced to 1% or less “spin down” or “bottom” pulp.
Cloudy Juice Applications

2-Vessel Citrus Debittering Plant

Production

Resin Wash

Regeneration
Clear Juice Applications

The clear juice systems are used for a broad range of applications, typically for upgrading the sensory properties and haze stability of juices or the manufacture of valuable products from waste material.

The following processes have been successfully developed and commercialised:

- Stabilisation to prevent haze formation of apple, pear and grape juice
- Colour reduction and standardisation of apple and pear juice
- Patulin reduction of apple and pear juice
- Hesperidin reduction to prevent haze formation of lemon juice
- Reduction of browning in lemon juice
- Deionisation of juices and extracts from processing and cannery wastes to produce clear fruit sugar syrups
- Acidity standardisation
- Recovery of anthocyanins and other bio-active components from juices and waste streams
Clear Juice Applications

3-Vessel Apple Juice Stabilisation Plant

Production

Displacement

Regeneration
Process Development

**Laboratory** Bucher Unipektin operates a well equipped laboratory. In-depth research and verification of techniques and materials is completed to a high standard at bench-scale. Results are used to design processes to suit customer requirements.

Additional analytical tools are available nearby at government and university research facilities.

Research work is also undertaken with customers on a contractual and confidential basis.

**Pilot Plants** Once a process is established in the laboratory further testing, process proving and development can be carried out at the customer’s site using one of our versatile pilot plants.

**Research Success** Bucher Unipektin has developed many processes using ion-exchange and adsorbent polymer technology. Examples include:

- Extraction of anthocyanins as natural colourants from juice or pomace: aronia, elderberry, grape, black carrot
- Extraction of phenolic components useful as antioxidants (bio-actives)
- Purification of gelatine
- Recovery of limonoid glucosides
- Recovery of herbal extracts
- Extraction/purification of nutraceuticals
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