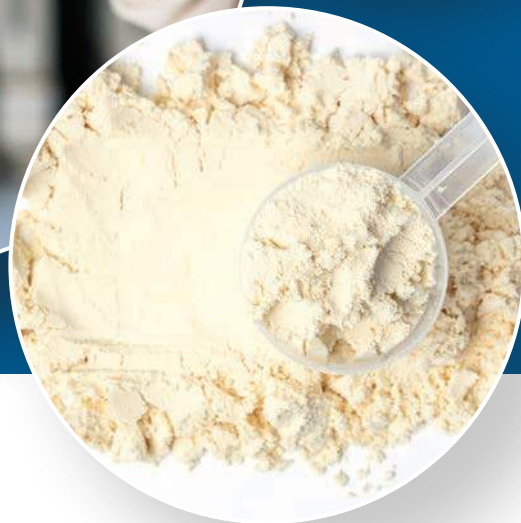
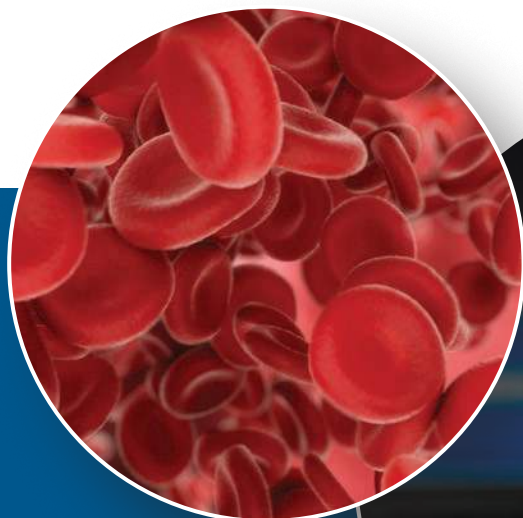


Animal Blood Products

Efficient Separation Solutions for Plasma,
Proteins, and More



K KOCHTM
SEPARATION SOLUTIONS

*Separation Technologies for a Better Future*TM

The KSS Advantage

Koch Separation Solutions (KSS) is transforming the landscape of separations by leveraging synergistic technologies such as membrane filtration, ion exchange, evaporation, and drying. Our comprehensive, start-to-finish solutions are tailored to improve product quality, increase process efficiency, and drive down costs in dairy, food and beverage, life science, and industrial markets around the world.

As a part of Koch Industries, KSS leverages a global reach and extensive resources to provide cutting-edge solutions for a variety of industries. Koch Industries has over 130,000 employees worldwide and reinvests 90% of its earnings to drive transformation and innovation.

Excellent Process Efficiency in Animal Blood Products Development

We work closely with our customers to understand their unique processing needs and offer a complete package solution that meets their goals, eliminating the need for multiple equipment vendors. KSS helps customers drive down operating costs while producing a more competitive product.

Partnering with KSS allows customers to gain access to trusted separation technologies, customer-focused R&D capabilities, field service, process monitoring, and long-term support. We simplify maintenance and support while offering producers of animal blood products a higher degree of control over their operation.

Collaborative Innovation

KSS partners with our customers to work collaboratively, combining our deep applications knowledge with their unique process expertise to identify the best-fit solution. Maintaining long-lasting partnerships with our customers allows us to develop and optimize new products and solutions to achieve a cycle of mutually beneficial progress.



EARLY-STAGE DEVELOPMENT

- Understand challenge & identify desired outcomes
- Evaluation of separation properties & bench testing
- Access to Process and R&D experts

FIELD TESTING

- Pilot testing
- Process optimization
- Full scale costing and design recommendation

FULL-SCALE EXECUTION

- Project management & execution of capital projects
- Construction and installation
- Commissioning and operator training

LONG-TERM SUPPORT

- Complete after-sales services
- System troubleshooting
- Performance optimization through remote digital monitoring program

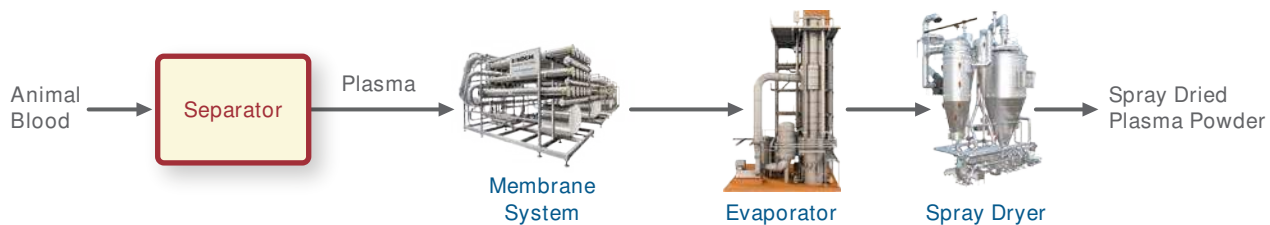
The KSS Advantage

Animal Blood Products

KSS streamlines the production of plasma and other animal blood products by integrating separation technologies to optimize process performance. Leveraging the synergistic capabilities of combined separation technologies results in significant reductions in energy consumption and operating costs.

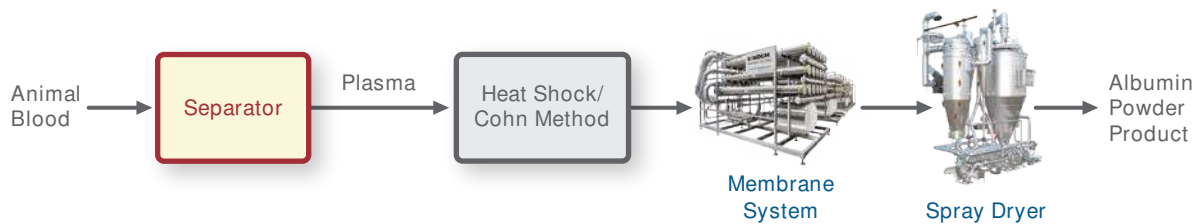
Plasma concentration and drying

Combining KSS membrane, evaporation and spray drying technology results in a stable powder plasma product.



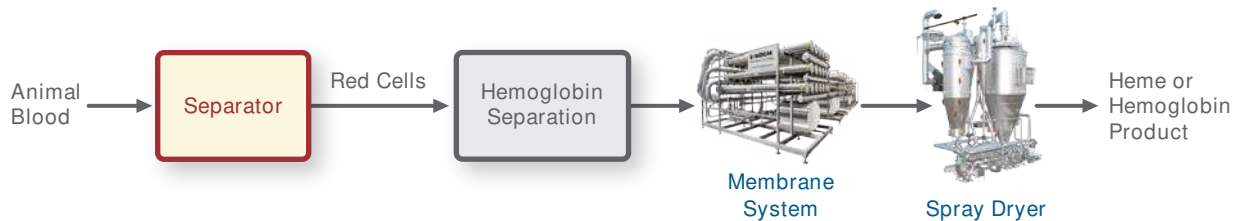
Albumin purification, concentration and drying

Membrane filtration effectively removes unwanted plasma proteins and inorganic salts while concentrating the albumin product. Spray dryers produce a consistent powder product.



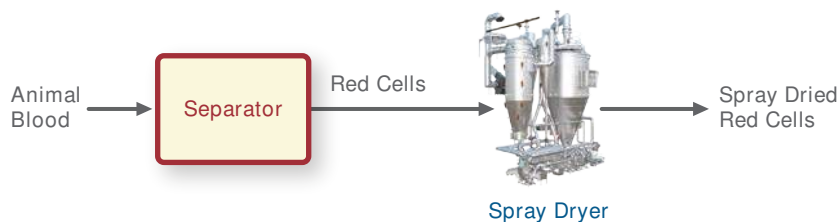
Hemoglobin concentration and drying

KSS' broad range of pore sizes enables effective separation of hemoglobin, or of heme groups from lysed red blood cells.



Red blood cells drying

Our spray drying technology efficiently dries red blood cells into a stable powder.



Major Applications

Concentration and Purification

KSS is the preferred partner for concentration and purification applications in the animal blood products market. Our advanced membrane technologies are trusted by leaders in the food industry worldwide.

- **Concentration:** Spiral ultrafiltration (UF), nanofiltration (NF) and reverse osmosis (RO) membrane systems are a gentle and energy-efficient method for the concentration of plasma and fractionated plasma proteins.
- **Purification:** With a broad range of membrane types and molecular weight cutoffs, KSS membrane systems purify target molecules by removing contaminants with precision.
 - ▶ UF membrane systems increase protein concentration by selective removal of sugars, salts and other unwanted compounds.
 - ▶ KSS Sani-Pro® systems achieve up to 85% plasma protein in total solids levels up to 20%.
 - ▶ NF and RO systems increase total solids by removing water.



Bacteria Removal and Demineralization

KSS extensive portfolio of membrane system technology can also tackle demineralization and bacteria removal, improving purity of our customers' products.

- **Bacteria Removal:** Ceramic microfiltration (MF) membranes provide a gentle and effective alternative to a bactofuge. Membranes can remove certain types of bacteria more effectively due to their higher selectivity and precision.
- **Demineralization:** KSS spiral membrane systems can be designed to perform diafiltration on concentrated plasma product, removing inorganic salts and allowing customers to meet quality standards and achieve a higher purity protein product.

Major Applications

Sani-Pro Spiral Membrane Systems

KSS Sani-Pro® spiral membrane systems are offered in both standard and custom designs to meet customers' specific needs. Sani-Pro systems rely on advanced crossflow filtration membranes that combine innovative construction techniques and optimized subcomponents. Sani-Pro systems can be designed with UF, NF or RO membranes.

Features & Benefits

- High productivity
- Energy efficient operation
- Reduced operating costs and water consumption
- Advanced remote monitoring and control options
- Unparalleled customer service and support through KSS ASSIST™
- Robust sanitary construction
- FDA, 3-A, EU, and Halal Compliant



Ceramic Membrane Systems

KSS ceramic membrane systems are designed across a wide range of MF and UF pore sizes. The long lifetime of ceramic membrane modules makes ceramic systems a cost-effective solution, while the thermal and chemical compatibility allows for aggressive operating and cleaning conditions without compromising product life. High temperature sanitization cycles are handled with ease to ensure efficient and safe operation.

Features & Benefits

- Robust system design and construction with sanitary and 3-A design options
- Advanced remote monitoring and control options
- Unparalleled customer service and support through KSS ASSIST
- Membranes are FDA, EU, and Halal Compliant
- Excellent chemical and thermal compatibility resulting in long membrane life

Major Applications

KSS offers RELCO® thermal separation technologies to provide customers with a complete solution. Evaporators, dryers, and powder handling and packaging equipment are tailored to fit customers' needs and specifications. Our customers benefit from a start-to-finish process design featuring multi-functional controls, quality project execution and system commissioning, and exceptional aftermarket services.

Evaporation

RELCO evaporators offer a gentle and efficient method for concentrating plasma prior to drying. Our systems are custom engineered and operate with high efficiency to produce consistent products.

Features & Benefits

- Available in tubular or plate configuration
- Mechanical (MVR) or Thermal (TVR) vapor recompression
- Low temperature operation preserves protein properties
- Designed to achieve final solids concentration suitable for drying

Drying

Flexible RELCO spray drying technology provides the ideal solution for drying plasma proteins or red blood cells. Designed with operator safety in mind, our dryers are easy to control and have low capital and operating costs.

Features & Benefits

- Single or multi stage dryer configurations available
- High or low temperature operation
- Careful airflow control and exhaust air filtration
- Customizable design includes options for heat recovery, agglomeration and many other features



Powder Handling & Packaging Equipment

For a complete processing solution, we provide conveying systems, packaging systems, bulk bag fillers, powder gassing and blending equipment to fulfill food processing needs.

- High-rate transfer of fragile powders by pressure or vacuum
- Hygienic semi-automatic or automatic powder packaging lines
- Stable and accurate bag filling, simplified bag transport, and robust bag unloading

Major Applications

Water and Wastewater Treatment

KSS is an industry leader in sustainable and energy efficient water and wastewater treatment solutions. As part of our start-to-finish solution for animal blood products processing, we offer process water treatment, RO for water reuse and waste minimization, and MBR treatment for a variety of wastewater. KSS water and wastewater treatment solutions help customers meet stringent wastewater discharge standards, produce high-quality water for reuse at their facility, and meet their overall sustainability goals.



PURON® MP Systems for Water Treatment

- Low maintenance, cost-effective, and reliable water treatment
- Optimal separation properties for high quality water production
- Constructed with a strong, virtually unbreakable hollow fiber to extend membrane lifetime

Best-In-Class Wastewater Treatment

- INDU-COR™ HD external MBR featuring tubular crossflow membranes for optimized system performance and footprint
- Low-energy PULSION® immersed MBR featuring virtually unbreakable hollow fiber membrane for effective removal of organics and solids

FLUID SYSTEMS® NF and RO for High-Purity Water

- Polishing of MBR, MF, and UF effluents to produce high quality water for reuse
- Pre-engineered or custom-designed systems



Koch Separation Solutions

Koch Separation Solutions (KSS) is a global leader in separation technologies. With best-in-class domain expertise, technologies and systems, KSS is uniquely positioned to help customers purify and recover valuable process streams and achieve sustainability goals across food and beverage, life science, and general industrial markets.

Services & Support

KSS ASSIST™ Service & Maintenance Program • RELCO After-Market Services • SepTrac™ Smart System



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KOCH
SEPARATION SOLUTIONS

Separation Technologies for a Better Future™

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