

Industrial Soy Protein Production

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Solae - Innovation through Nature

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Do you know that in average the CO₂ emission from your car is in the same order of the food you are consuming? Food production has attracted attention from the global community due to its demand on large amounts of energy and natural resources. When evaluating the environmental impact of various foods, soy protein is a sustainable solution. Soy provides a high quality protein that is comparable to milk, meat and eggs and is a far more cost effective and environmentally conservative protein resource. In addition, Soy protein is the only protein with a FDA health claim, and is clinically proven to help improve heart health.

Commercial Soy Proteins are classified based on the protein contents. Soy isolates has at least 90% protein, while a Soy concentrate contains 65% and Soy textured proteins at least 52%. The industrial production process of Soy proteins was introduced more than 50 years ago. After the oil extraction from the soy beans the residual white flakes are containing fibers, proteins, sugars and minerals. The soy proteins are extracted from white flakes using water and the fibers are removed using solid bowl centrifuges. By changing the pH to 4.5 the proteins precipitate out from the extract. The precipitated proteins are further concentrated to an isolate, concentrate or textured protein using decanters and disc centrifuges.

To improve further quality and reduce the environmental footprint, recently new soy protein processes are introduced and considered. One option is to use membrane technology to increase yield. To separate specific soy proteins chromatographic technology is a common process to use. Water recycling will play a critical role in the future. The presentation will provide an overview on industrial soy production as well as the new separation technology used in this area.

Solae is the world leader in developing soy-based technologies and ingredients enjoyed by consumers around the world in products such as baked goods, beverages, nutrition bars, meats, vegetarian meals and much more. Since Solae's inception more than 50 years ago, Solae has dedicated itself to soy research and product development, providing innovative solutions to enhance the nutritional, functional and economical benefits of soy food products. Headquartered in St. Louis, Missouri, USA, Solae was formed in 2003 through a joint venture between DuPont and Bunge and is the largest soy protein producer in the world.

Dr. Karsten C. Keller Biography

Dr. Karsten Keller is an Engineering Fellow and Associate Director of the R&D Engineering group at Solae and has over 20 years of process engineering experience. Karsten is developing novel processes for soy protein and new product opportunities from the lab-scale to commercial production.

Prior to joining Solae, Dr. Keller was manager at DuET (DuPont Engineering) in the field of Modeling and Particle Technology. Previous to that, he held various technical positions in DuPont Central Research and Development. Before joining DuPont he led his own engineering consulting company for six years.

Karsten is a Chemical Engineer from the KIT (Karlsruhe Institute of technology) in Germany and is the author of over 80 publications on subjects of separation, modeling, particle technology, biotechnology and nanotechnology. He is the inventor of 8 patents worldwide. He is an active member of the VDI (German Engineering Society), DECHEMA (German Chemical Society) and the AFS (American Filtration Society). He has led international European research work (NanoBioMag, MagPro2Life) and was advising Ph.D. students at the MIT. In 2002, Karsten received the DuPont Sustainability Award and in 2005 he was recognized as the youngest non-academic person with the Frank Tiller Lifetime Achievement award for Leadership in Engineering and Education.

He is married to Christa and has one daughter Judith. He has a passion for soccer and motor sports (Formula 1).