Separation and Purification of 1,18-Octadecenedioic acid

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Biotechnological processes are becoming increasingly important for the manufacture of chemical products such as special polymers, fine chemicals and pharmaceuticals. Therefore, in the mid of 2005, eight Fraunhofer institutes joined to form a research alliance. The research activities are geared towards developing and establishing a technology platform for the integrated manufacture of bio-based chemical products using biotechnological processes, with optimum utilization of natural synthesis. Plant oils and fats are being used as model systems. As an example, the components of the fats (fatty acids/ monocarboxylic acids) are transformed by biotechnological means into α,ω-dicarboxylic acids (1,18-octadcenedioic acid). These chemicals are then converted into polymeric products.

The success of biotechnological processes is determined by the chosen bioconversion step as well as by the processes for product isolation and purification. Following the bioconversion, the raw product mixtures typically only contain low concentrations of the desired product. At the same time, there are great requirements on the purity of the final product. These conditions place high demands on the selection and optimal setup of the necessary separation and purification technology.

As the experiments showed, Carboxylic acids, particularly dicarboxylic acids, can be separated from a fermentation broth by adjusting the pH of the fermentation broth and heating the broth to a temperature sufficient to cause formation of three immiscible phases. One of these phases is an organic phase containing the carboxylic and dicarboxylic acids and can be separated from the two other phases.

The separation of the carboxylic acids / dicarboxylic acids from unreacted starting materials and reaction by-products can be achieved by extracting with an organic solvent. The following purification is characterised by the recovering of the organic solvent and the separation of monoand dicarboxylic acids by distillation.