

SEPARATIONS SAVVY

ENGINEERED SMARTER. BUILT MODULAR.

Fermentation in Your Process?

Use Extraction to Recover Valuable Product from Biomass

In recent years there has been a large emphasis on the production of organic chemicals from biomass generated via processes such as fermentation. Most of these processes produce low concentrations of organic chemicals that are higher boiling than water, and as such, distillation is not a viable first step for the recovery and purification process. [Liquid-Liquid Extraction \(LLE\)](#) is an ideal unit operation for the removal of many of these compounds either directly from the broth itself (whole broth) or from the broth after some pre-treatment step to separate the less desirable components such as cell mass, lignin, etc.¹

Many biomass systems, especially those produced by fermentation processes or by algae ponds demonstrate a tendency towards emulsification upon contact with the extraction solvent. Years of experience have shown that the reciprocating type agitation used by a [KARR® Column](#) is superior to rotating internals for systems that have a tendency to emulsify². Selection of the column type is critical in order to optimize the performance and cost for the extraction process. Three steps to a complete system design include:

1. Solvent Selection and Laboratory Testing are necessary to generate the liquid-liquid equilibrium data and to evaluate the hydraulic behavior for the system.
2. Pilot Plant Testing should be performed to generate data for accurate design of production equipment. Koch Modular handles this at its pilot facility in Texas.
3. Complete System Design: Downstream distillation is usually required to recover the solvents for recycle and to selectively recover and purify the chemicals of interest. It is critical to have a good understanding of the composition of the LLE feed as well as the final compositions of both the extract and raffinate phases leaving the extraction column so that the distillation columns can be designed accordingly.

Bring your toughest biomass challenges to discuss at our booth at ACHEMA next month. We will have an extraction column on site and our subject matter expert, Don Glatz, available for detailed technical conversation.

UNIT OPS



“Chemical Engineering goes sweet.”

UPCOMING EVENTS

June 5-7

AIChE Process Development Symposium (Oak Brook, IL)

Presentations by: Tom Schafer & Don Glatz

June 11-15

ACHEMA – World Forum and Leading Show for the Process Industries (Frankfurt am Main, Germany)

Presentations by: Tom Schafer & Don Glatz

AT ACHEMA (Germany) You're Invited: June 14th 2018

Visit us at our booth in Hall 4 Stand D1

11:10 - 11:30

Modular Construction: An Economic Solution To Regionalized Small Scale Chemical Production

Presenter: Tom Schafer | **Location:** Dialog Room in Hall 9.2

12:10 - 12:30

Designing Liquid-Liquid Extraction Columns Through Optimized Pilot Plant Testing

Presenter: Don Glatz | **Location:** Consens Room in Hall 4.C

Literature Cited: (1) Cusack, R., Fremeaux, P., and Glatz, D., "A Fresh Look at Liquid-Liquid Extraction, Extractor Design and Specification", *Chemical Engineering*, February 1991. (2) Cusack, R., Fremeaux, P., and Glatz, D., "A Fresh Look at Liquid-Liquid Extraction", *Chemical Engineering*, March 1991.