# Spent IPA Dehydration for In-house Reclamation – An Efficient, Complete Process to Solve the Environment Issues

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Many commercial hydrophilic solvents form azeotropes or have vapor-liquid equilibrium (VLE) pinch points with water, making solvent recovery by conventional distillation difficult. Solvents that form such azeotropes or have such pinch points include isopropyl alcohol (IPA), acetone, methyl ethyl ketone (MEK), ethyl acetate, ethanol, butanol and tetrahydrofuran etc. Molecular sieve drying is possible, but requires large amount of energy to vaporize the solvent/water mixture, and is generally not economical for situations where water concentration is more than 5 wt%. A simple alternative process is pervaporative dehydration to reclaim and reuse the solvent on-site.

This talk will use IPA as an example to present a pervaporation apparatus and process for spent IPA dehydration. Currently, spent IPA generated in our company is disposed of as hazardous waste, at a cost of about $18/gal. Virgin, high-purity IPA costs about $23/gal, so the total cost of IPA used as a cleaning/drying agent is in the range of $41/gal. There is therefore a considerable economic and environmental driving force to recover and reuse the IPA solvent. A pilot system was constructed for IPA reclamation which has a treatment capacity up to 200 gal/day. Batches of spent IPA (50-100 gallons for each batch) with an average water concentration of 15 wt% are reclaimed using this pilot system via a single 4-inch module, the reclaimed dry IPA contains less than 1 wt% water. Stable module performance has been demonstrated. We will show this simple batch system can be configured to achieve the separation performance comparable to a one-stage, two-stage, two-step and more complicated pervaporation system designs.