AMT INTERNATIONAL, INC.

ADVANCED DEHYHDRATION IN TPA PLANTS

ADP II Acetic Acid Dehydration Process

OVERVIEW

Two different approaches are frequently used in the recovery of Acetic Acid from the reaction water in the Terephthalic Acid (TPA) plants, namely, via conventional distillation by the different boiling points of the components, or, via azeotropic distillation with the addition of entrainers, such as the iso-butyl acetate (IBA), n-butyl acetate (NBA), iso-propyl acetate (IPA), n-propyl acetate (NPA). While used as entrainers in acetic acid/water azeotropic distillation, the same alkyl-acetates are also known as a good liquid-liquid extraction solvent for acetic acid extraction.

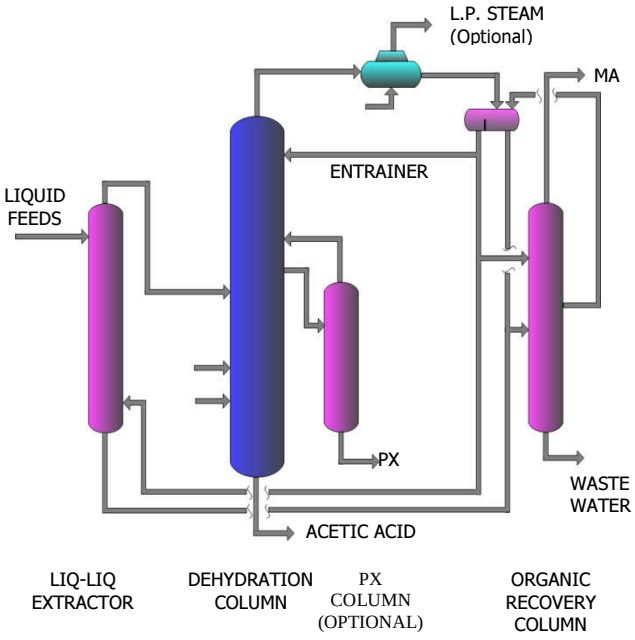
Since AMT's successful introduction of it's patented ADP azeotropic distillation process in 2001, AMT has further improved it's ADP process. By integrating the azeotropic distillation process with the liquid-liquid extraction process equipped with AMT's patented ***ADE*** High Efficiency Liquid/Liquid Extraction Trays, AMT has developed its ADP II Process, a field-proven process, for even greater benefits and broader applications. The ADP II Process not only offers the benefits of an azeotropic distillation unit, but *further* reduces the energy consumption by over 20% with minimum CAPEX and OPEX. Compared with conventional distillation process, the ADP II Process offers an astounding 45-50% energy savings with >90% lower acetic acid losses. It provides the benefits for not only retrofitting the existing unit for greater throughput and lower operating costs, but also lowering the capital and operating costs for new units.

PROCESS DESCRIPTION

The ADP II Process consists of four (4) columns, i.e., Liquid-Liquid Extractor, Azeotropic Distillation Column, Organic Recovery Column, P-Xylene Column *(optional)* and the overhead steam generation system *(optional)*.

As shown in the simplified process flow diagram below, liquid acetic acid/water streams from the High & Low Pressure Absorbers, Oxidation water draw-off, MA Hydrolysis Unit, etc. are sent to the Liquid-Liquid Extractor while the vapor or flashing feeds are sent to the Azeotropic Distillation Column, respectively.

A portion of the entrainer from the Azeotropic distillation column decanter is sent to the liquid-liquid extractor as the extraction solvent. The extract from the top of the Extractor, containing mainly the solvent and acetic acid, is returned to the Azeotropic Distillation Column to separate the solvent and acetic acid. The raffinate from the bottom of the Extractor, containing primarily water with trace amount of organics is sent to the Organic Recovery Column to recovery organics.



ADP II PROCESS FLOW

PERFORMANCE COMPARISION

Since its first commercial application in 2006, the ADP II Process has repeatedly demonstrated its benefits of low energy consumption, low acetic acid loss, and wide operating flexibility in all projects, from existing plant revamps to grass-root plant construction.

The table below outlines the direct comparisons of the performances of various dehydration methods used in a typical, 500,000 MTA TPA Plant:

For more information, please contact:

AMT International, Inc., 5208 Tennyson Parkway, Plano, Texas 75024,
☎ Tel. : (972)378-0700, (972)378-0900 Fax : (972)378-9400 Email: information@amtintl.com

	Conventional distillation	Typical Azeotropic Distillation	AMT ADP Process	AMT ADP II Process
TPA Production	500,000	500,000	500,000	500,000
Entrainer	none	yes	yes	Yes
No. of trays in Dehydration Column	90	70	70	70
Overhead pressure	Atm	Atm	> Atm	> Atm
Typical Steam consumption in Dehydration Unit (T/HR)	79-86	51-57	51-57	38-43
Low Pressure Steam generation from Dehydration Section	Not Available	Not Available	Available	Available
Entrainer	No	Yes	Yes	Yes
Typical Acetic Acid conc. to Waste Water treating, ppm	7000	< 300	< 300	< 400
Total Acetic Acid loss to WWT, Ton/year	1040	<45	<45	<60

As shown in the table above, compared to the conventional distillation approach, the ADP II Process offers the following advantages:

- Reduces energy consumption by 45-50%
- Reduces acetic acid loss to the waste water by over 95%
- Increases the Dehydration Unit throughput by 45-50%
- Reduces waste water treatment costs

APPLICATION

The ADP II Process is most advantageous in debottlenecking an existing Dehydration Unit which uses conventional distillation approach for maximum throughput, minimum acetic acid loss, and minimum energy consumption. The low-pressure steam produced from this Process, if applied, can be utilized for electricity generation, which further reduces the operating costs.

The ADP II Process is also perfect for debottlenecking an existing azeotropic distillation unit for greater throughput and energy savings with relatively low capital investment since all the exiting azeotropic distillation equipment can be retained and re-used with little or no modifications.

This ADP II Process can also be implemented as a common unit for multi-train TPA plants to minimize the capital investments while getting the benefits for multiple trains.

The ADP II Process also enables the TPA Plants to further maximize the overall plant energy and operation efficiencies. Please contact AMT for details.

COMMERCIAL EXPERIENCES

As of to-date, AMT International Inc. has successfully applied its ADP and ADP II Process Technologies in combination with AMT's high performance mass transfer technology in twelve (12) and seven (7) commercial TPA Plants, with the plant capacity ranges from 250,000 MTA – 1,600,000 MTA, respectively.

In all cases, AMT has provided the complete process know-how, basic engineering packages, high performance mass transfer equipment and on-site start-up assistance.

AMT International, Inc.,
5208 Tennyson Parkway, Plano, Texas 75024,
☎ Tel. : (972)378-0700, (972)378-0900
Fax : (972)378-9400
Email: mail@amtintl.com