

Title: **Tetraacetythylenediamine (TAED): Development of a process and design of the basic engineering for its manufacture**

Student: Maria Sierra Moreno

Date: June 2020

Supervisor/s: Dr. Jose María Gutiérrez
Departament d'Enginyeria Química i Química Analítica

Tetraacetythylenediamine (TAED) is an organic compound that is generally used as a bleach activator in household detergents. The reaction of TAED with hydrogen peroxide is known as perhydrolysis, which results in the formation of peroxyacids that allow washing at very low temperatures.

The purpose of this project is to develop a continuous plant for the production process of TAED, as well as to perform its basic engineering. Generally, TAED is produced in two reactions: acetylation of ethylenediamine (EDA) generates diacetythylenediamine (DAED), which in reaction with acetic anhydride, produces TAED as the final product.

The manufacturing process design has been carried out for an annual production of 15 000 tons of TAED. This amount has been chosen taking into account the worldwide production volume of such substance. Different patents have been studied in order to find a basic recipe that could be scaled to industrial level. A production process based on the recipe has been synthesized, including also all the equipment involved. After that, all this information has been uploaded to Aspen Plus software, simulating the plant and determining the operating conditions and basic dimensions of the main equipment. To conclude, the project includes a selection of suitable equipment, extracted from the catalogues of different existing suppliers, that would be required in order to bring the proposed production process to a real industrial situation.

Keywords: Tetraacetythylenediamine, production process, equipment selection, equipment sizing, patent recipe.