

Separation Processes II

Calendar: 5th semester

Contact Hours: 30h00 T + 22h50 PL + 7h50 OT

Scientific Area: Processos em Engenharia Química e Biológica

Learning outcomes of the curricular unit

It is intended that the student learns the main unit operations involving heat transfer and mass transfer of global and partial balances applied to the design of industrial equipment.

The unit operations lectured are: distillation; gas absorption; liquid-liquid extraction. The goal is to supply the student with the tools for the design of equipment used in the studied unit operations and choose the most suitable for different applications. The students must obtain the following competencies: Identify the basic principles governing the different separation processes; choose processes more appropriate for a given separation; scale certain separation equipment and evaluate the influence of operating conditions on the final separation.

Syllabus

Chapter 1 - 5.5 weeks

Distillation

Principles. Flash Distillation. Continuous and batch distillation.

Distillation equipment: sieve columns and packed columns.

Chapter 2 - 3.5 weeks

Gas absorption

Concepts. Criteria for choosing the absorbent and types. Industrial equipment.

General considerations for the project. Design of packed columns.

Overall project Equation - strong absorption.

Chapter 3 - 4.0 weeks

Liquid-Liquid Extraction

Three phase systems. Ternary diagrams. Extraction of immiscible liquids. Liquid-Liquid Extraction for partially miscible systems.

Demonstration of the syllabus coherence with the curricular unit's objectives

The curricular unit of Separation II aims to supply students with the knowledge of separation processes used extensively by the chemical industry, particularly in the separation: of compounds by distillation, in packed columns (for gases) and liquid-liquid extraction. At the same time it is intended that students acquire the knowledge to analyze and size the separation equipment. The importance of these processes in the industry is very significant, for this reason it was decided to only consider these in the syllabus of this course in order to lecture these processes in a more comprehensive and deeper manner. Consequently, this course is divided into only three chapters, each corresponding to a separation process.

Teaching methodologies:

This curricular unit includes a theoretical and a practical component. The theoretical component is taught by PowerPoint computer presentations. The practical component includes exercise solving.

Demonstration of the coherence between the teaching methodologies and the learning outcomes.

The lecture method-with student intervention, adopted for the lectures is appropriate for the presentation of the content covered in the curricular unit. The exercises solved in practical classes serve to help understand some concepts that may be difficult to understand in the theoretical exposition. The written tests during the semester allow students to consolidate the knowledge acquired in stages during curricular unit.