

Plan 554 MASTER EN INGENIERÍA TERMODINÁMICA DE FLUIDOS

Asignatura 53849 INGENIERÍA DE PROCESOS CON FLUIDOS SUPERCRÍTICOS: PROCESOS CON SEPARACIÓN

Tipo de asignatura (básica, obligatoria u optativa)

Optativa

Créditos ECTS

4.5

Competencias que contribuye a desarrollar

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Objetivos/Resultados de aprendizaje

- Fundamentos de los procesos de separación con fluidos supercríticos
- Nuevas tecnologías de separación basadas en el uso de CO₂.

Contenidos

1. Pressurized fluids. Dense gases and/or supercritical fluids. Fundamentals of supercritical fluids. Industrial use of SCFs in reaction processes. Industrial use of SCFs in separation processes.
2. Properties of supercritical fluids
Density (PVT Behaviour). Thermodynamic properties. Transport properties. Properties estimation.
3. Phase equilibria
General concepts on Phase Equilibria calculations. High-pressure phase equilibria. Equations of state. Thermodynamic models. Classification of the most common GE models of applications. Experimental methods of vapor-liquid equilibria determination.
4. Power Consumption with FSC processes
Gas solvent recirculation. Liquid solvent recirculation. Separation process in cuasi-isobaric conditions.
5. Supercritical extraction process from solid matrix
Fundamentals of extraction. Transport phenomena in the solid phase. Extraction curves. Influence of process parameters and conditions of the solid substrate in the extraction process. Modelling and scale-up SCE processes. Design criteria. Laboratory and pilot plants. Equipment. Industrial applications.
6. Practical case. SFE Modeling
Development of a supercritical extraction process. Supercritical extraction plant for wheat germ oil production.
7. Supercritical fluids for materials processing I.
SCF as a solvent: RESS process (Rapid Expansion of Supercritical Solutions) Fundamentals of particle precipitation. RESS Process: process description. Modeling of the process. SCF as a cosolvent: PGSS (Particles from Gas Saturated Solutions).
8. Supercritical fluids for materials processing II.
SCF as an antisolvent: GAS and SAS processes (Gas Antisolvent Processes and Supercritical Antisolvent Processes). SFEE Supercritical fluid extraction of emulsions.
9. Other separation processes with supercritical fluids. Fundamentals of adsorption-desorption processes. Impregnation. CO₂SC textile Dyeing. Natural fibers, synthetic. Modifications of the dyes. Modification of the fibers. CO₂SC cleaning processes: surfaces, electronics, optics, fibers. Drying aerogels.

Principios Metodológicos/Métodos Docentes

- Clases expositivas
- Clases prácticas, tutorías y seminarios

Calendario y horario

Consultar página web de la Escuela de Ingenierías Industriales

Tabla de Dedicación del Estudiante a la Asignatura/Plan de Trabajo

ACTIVIDADES PRESENCIALES

HORAS

ACTIVIDADES NO PRESENCIALES

HORAS

Clases presenciales

40

Trabajo individual

90

Seminarios

10

Laboratorios

10

Total presencial

60

Total no presencial

90

Responsable de la docencia (recomendable que se incluya información de contacto y breve CV en el que aparezcan sus líneas de investigación y alguna publicación relevante)

María José Cocero

Idioma en que se imparte

Español