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# VNIVERSITAT E VALÈNCIA (ò\*) **Facultat de Química**

## DEGREE FINAL PROJECT CHEMISTRY DEGREE

**ACADEMIC TUTOR 1**

Antonio Doménech Carbó

**ACADEMIC TUTOR 2**

**EXTERNAL TUTOR (if needed):**

**DEPARTMENT(S):** Analytical Chemistry

**TITLE (Mandatory in English)**

Provenance discrimination of archaeological ceramics combining spectroscopic and electrochemical techniques

**OBJECTIVES / OBJECTIUS / OBJETIVOS: (Choose the language)**

Elucidation of the production of local workshops from products of importation in samples of ceramicware from archaeological sites of iberian age

**METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)**

Theoretical/Experimental

# VNIVERSITAT DE VALÈNCIA Facultat de Química

## DEGREE FINAL PROJECT CHEMISTRY DEGREE

ACADEMIC TUTOR 1 ADELA MAURI AUCEJO

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): QUÍMICA ANALÍTICA

**TITLE (Mandatory in English)**

Development of an integrated sampling and detection system for monitoring environmental pollutants.

**OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)**

L'objectiu general del treball és desenvolupar un sistema integrat de mostreig i detecció d'alquilfenols en mostres ambientals utilitzant polímers de beta-ciclodextrina com a adsorbents i detectar els contaminants directament sobre el sòlid mitjançant espectrofluorimetria, eliminant així l'ús de dissolvents minimitzant els riscos ambientals i humans, consolidant un sistema d'anàlisi més ràpid, net i per tant, més sostenible.

**METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)**

El projecte s'estructurarà en una revisió bibliogràfica i quatre fases experimentals basades en els principis de la Química Verda (reducció de residus i economia d'àtoms). En primer lloc, es durà a terme la síntesi i caracterització del polímer de beta-ciclodextrina, optimitzant les condicions per a obtenir un suport sòlid homogeni i altament afí als analits. En segon lloc, es realitzaran els assajos d'exposició per a avaluar la capacitat de retenció i captació d'alquilfenols en matrius mediambientals mitjançant la formació de complexos d'inclusió. La tercera fase consistirà en l'optimització de la lectura en l'equip de fluorescència, dissenyant un suport d'anàlisi directa sobre la superfície sòlida. Finalment, es validaran els paràmetres analítics del mètode.

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## DEGREE FINAL PROJECT CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Lorenzo San Juan Navarro

ACADEMIC TUTOR 2 Yolanda Moliner Martínez

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Analytical Chemistry

TITLE (Mandatory in English)

Emerging contaminants

### OBJECTIVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of the proposed work is the development of characterization, separation and sample pretreatment methods for the study of emerging contaminants in matrices of interest, mainly environmental samples. Firstly, sample pretreatment technique and detection technique will be selected as a function of the analysis requirements. Subsequently, the validation and application of studied procedure will be evaluated for the analysis of real samples.

### METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The methodology will be the following:

- Bibliographic review
- Selection of the emerging pollutants
- Selection of sample treatment and analysis techniques
- Optimization of experimental variables
- Sample analysis
- Preparation and elaboration of the report for the Final Degree Project.

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## DEGREE FINAL PROJECT CHEMISTRY DEGREE

ACADEMIC TUTOR 1    Neus Jornet Martínez

ACADEMIC TUTOR 2    Carmen Molins Legua

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Analítica

TITLE (Mandatory in English)

Colorimetric sensors

### OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The goal of this project is the development of colorimetric sensors based on the immobilisation of the reagents onto different polymeric supports (cellulose, PDMS, PMMA, PVP, zein...), using different preparation techniques (electrospinning, solvent casting...). The obtained sensors will be characterized (by diffuse reflectance, IR...) and evaluated regarding their analytical performance. Finally, the sensors will be applied to the analysis of different analytes and matrices.

### METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The methodology to follow will be the following:

- Bibliographic review.
- Selection of articles of interest.
- Synthesis of the colorimetric sensors
- Study of sample treatments and analytical performance
- Preparation of the report for the Final Degree Project.

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## DEGREE FINAL PROJECT CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Yolanda Moliner Martínez

ACADEMIC TUTOR 2 Lorenzo San Juan Navarro

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Analytical Chemistry

TITLE (Mandatory in English)

Chemical sensors for biomarkers study

### OBJECTIVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of this project is the development of chemical sensors for the analysis of biological samples. For this aim, sample treatment techniques will be applied to the analytes of interest. Detection will be based on analysis techniques such as portable optical spectroscopy and miniaturized chromatographic techniques, particularly, liquid chromatography with different detection systems (UV-vis and MS).

### METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The methodology is the following:

- Bibliographic review
- Selection of analytes and samples of interest
- Selection of sample treatment and analysis techniques
- Optimization of experimental variables
- Sample analysis
- Preparation and elaboration of the report for the Final Degree Project.

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## DEGREE FINAL PROJECT CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Enrique Javier Carrasco Correa

ACADEMIC TUTOR 2 Juan Luis Benedé Veiga

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Analytical Chemistry

**TITLE (Mandatory in English)**

3D-Printed microdevice with removable blades containing functional materials for biomarker extraction in biological fluids

**OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)**

The main objective is to develop a 3D-printed microdevice with removable blades modified with functional materials for the extraction of selected biomarkers from biological fluids like saliva, urine, or serum. The project will focus on optimizing a user-friendly 3D micro-design and screening various advanced sorbents (polymers, MOFs, or selective ligands). Finally, the integrated platform will be validated through the extraction of targeted biomarkers from real matrices, followed by high-sensitivity determination using LC-MS/MS.

**METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)**

The experimental workflow will begin with the architectural design and fabrication of the microdevice and its removable blades using high-resolution 3D printing, optimizing the geometry to facilitate straightforward assembly and operation. Concurrently, different functional materials will be evaluated in dispersive solid-phase extraction mode to select the optimal sorbent. Once the optimal material is determined, a localized surface modification protocol will be established to immobilize it securely onto the 3D-printed blades. Parameters such as sample volume, extraction time, and elution conditions will be fine-tuned to validate the analytical performance of the functionalized microdevice using fortified biological fluids. Finally, real samples will be analyzed by LC-MS/MS for clinical biomarker monitoring.

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## DEGREE FINAL PROJECT CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Enrique Javier Carrasco Correa

ACADEMIC TUTOR 2 María Vergara Barberán

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Analytical Chemistry

TITLE (Mandatory in English)

3D-Printed rotating disk with stretchable chains modified with mixed-mode polymers for selective solid-phase extraction

### OBJECTIVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The main objective of this work is to develop a solid-phase extraction platform based on a 3D-printed rotating disk containing stretchable chains for the simultaneous capture and sequential elution of oppositely charged analytes. Utilizing the proposed device, the specific goal is to chemically functionalize the chains in a segmented 3-and-3 design: three chains will be modified with a positively charged polymer, while the remaining three chains will be coated with a negatively charged polymer. This spatial and chemical segregation aims to establish a mixed-mode extraction system capable of isolating both cationic and anionic targets from a single matrix in parallel, allowing targeted and fractionated desorption

### METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The experimental workflow will begin with the manufacturing of the rotating disk device and its stretchable chains using stereolithography (SLA) 3D printing to ensure high-resolution geometries. Next, a localized surface modification protocol will be implemented to functionalize the strands: three chains will be coated with the META polymer to introduce permanent positive charges, and the other three will be modified with the AMPS polymer to provide negative charges. Once the dual-functionalized platform is prepared, analytical validation will be performed by conducting extraction procedures with model mixtures containing ionic analytes. Finally, parameters such as sample pH and rotation speed will be optimized to maximize electrostatic binding, followed by the development of a fractionated elution strategy to recover each chemical fraction separately prior to liquid chromatography determination.

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ACADEMIC TUTOR 1 José Manuel Herrero Martínez

ACADEMIC TUTOR 2 Héctor Martínez Pérez-Cejuela

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Analytical Chemistry

TITLE (Mandatory in English)

Development of a sensor device incorporating metal-organic frameworks for recognition of toxins in environmental waters

OBJECTIVES / OBJECTIUS / OBJETIVOS: (Choose the language)

- Design and develop of MOF sensing properties for the detection of relevant toxins.
- Select and optimize suitable platforms for portable sensing.
- Evaluate the analytical performance of the developed sensors
- Test the applicability of the sensors in environmental real samples

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

- Literature review on toxins, MOF and sensing.
- Develop the sensor using MOF as chromogenic/fluorogenic substrate, and optimize sensing conditions.
- Evaluate the sensor's performance (linear range, LOD, selectivity, reproducibility, etc.)
- Apply the optimized sensor to real samples and practical usability.
- Preparation, discussion, and review of the final project.