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National Technical University of Athens







ΔΗΜΟΣ ΧΑΝΙΩΝ EMUNICIPALITY OF ANIA · CRETE





**10<sup>th</sup> International** Conference on

Sustainable Solid Waste Management









## Biosorption of a cationic dye using raw and functionalized *Chenopodium quinoa* pericarp biomass after saponin extraction, a sustainable approach to a green, zero waste-management

Supervised by:

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### **COLLABORATION**







**Mohammed VI Polytechnic University on MAY 2023** 



# **1** GENERAL INTRODUCTION



# OUTLINE

**3** RESULTS AND DISCUSSION

4 CONCLUSION AND PROSPECTS



### **INTRODUCTION : TOWARDS SUSTAINABLE MATERIALS**



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### **INTRODUCTION : IMPORTANCE OF LIGNOCELLULOSIC BIOMASS AND ITS MAJOR SOURCES**

- Abundant biopolymers on earth
- Biodegradable, sustainble and low cost,
- Tailored capability for chemical transformations





Agro-industrial residues (Argan nut shells...)



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### **INTRODUCTION : QUINOA BIO-WASTE**



Quinoa (Chenopodium quinoa Wild.)

### **INTRODUCTION : DYES REMOVAL USING BIOSORBENTS**





AIMS OF THE WORK







### **I-SAPONIN EXTRACTION AND QBW WASTE GENERATION**



### **II- BIOSORBENT PREPARATION**



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# **RESULTS : KINETICS AND EQUILIBRIUM ISOTHERM**



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### **RESULTS : ADSORPTION KINETICS AND ISOTHERMS**



Biosorbents	Conditions	Adsorption	Isotherm model	Kinetic	Reference
		capacity(mg.g <sup>-1</sup> )		model	
Banana pseudo-	570 min	333.3	Freundlich		(Bello et al.,
stem	pH 7			_	2018)
Populus tremula	10 min	145.3	Freundlich	_	(Sebeia et
(seeds)	рН б			_	al., 2019)
Chlamydomonas	60 min	115	Freundlich		(Moghazy,
<i>variabilis</i> (algae)	pH 7			<b>D</b> CO	2019)
Agrobacterium	60 min	91	Freundlich	- PSO	(Sharma et
<i>fabrum</i> (bacteria)	pH 11				al., 2018)
Ficus palmata	80 min	6.89	Freundlich	-	(Fiaz et al.,
(Plant leaves)	pH 7			_	2019)
QBW-II	60 min	193,8	Langmuir	_	This work
	pH 7				

**<u>Table.</u>** Methylene blue biosorption data using various bio-sorbents.

### **RESULTS : FTIR SPECTROSCOPY ANALYSIS**



biosorption.

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### **RESULTS : ZETA POTENTIAL AND ZERO-POINT CHARGE MEASUREMENT**



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### **RESULTS : PROPOSED MECHANISMS OF MB BIOSORPTION INTO QBW**







**CONCLUSION AND PERSPECTIVES** 







# OUR TEAM









#### PhD. Anass OULKHIR

**Dr. Mohammed DANOUCHE** 

Dr. Karim LYAMLOULI

Pr. Rachid BENHIDA\*

# **ACKNOWLEDGMENT**









N Chimie de Nice









AgroBioSciences





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