



Maestría en Ingeniería en Diseño de Bioprocesos

Title

**Evaluation of biosurfactants production of
three Pseudomonas species in cheese whey**

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Evaluation of biosurfactant production of three *Pseudomonas* species in cheese whey

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1. Introduction

Due to the pollution caused by the whey by high values of BOD and COD and because is a rich carbon source, seeks to use the waste to produce biosurfactants.

Biosurfactants are amphiphilic molecules having emulsifying properties and are able to reduce the interfacial tension between the aqueous and oil phase, for that reason are widely used in environmental bioremediation processes.

Pseudomonas species are able to produce a rhamnolipid and this work will evaluate the production of *P. putida*, *P. aeruginosa* and *P. fluorescens* in cheese whey.

2. Objectives

2.1. General objective

Evaluate the microbial production of biosurfactants from whey with three types of *Pseudomonas*.

2.2. Particular objectives

- Characterize whey by proximal analysis
- Select strains producers of biosurfactants
- Determine the potential of fermentative production of biosurfactants in fresh whey in submerged cultures with three *Pseudomonas* species.

3. Methods

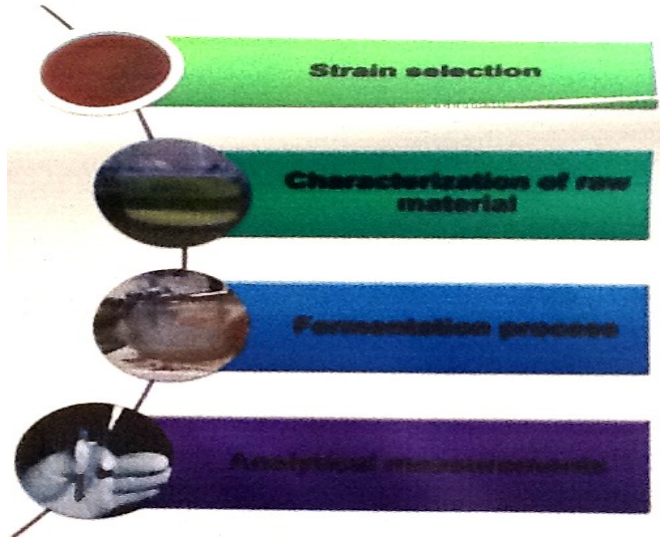


Figure 1. Methods used in this research

3.1 Strain selection

The isolated bacteria are plated on blood agar to observe their hemolytic capacity, those who had a β -hemolysis were considered as potential producers of biosurfactants.

3.2 Characterization of raw material

It was used an ultrasonic analyzer (Lactoscan) for the following parameters: Fat, SNF, proteins, salts, lactose, added water, freezing point, density and temperature.



Figure 2. Lactoscan

3.3 Fermentation process

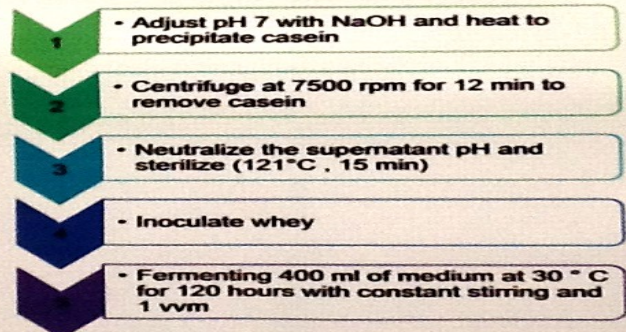


Figure 3. Fermentation parameters

3.4 Analytical measurements

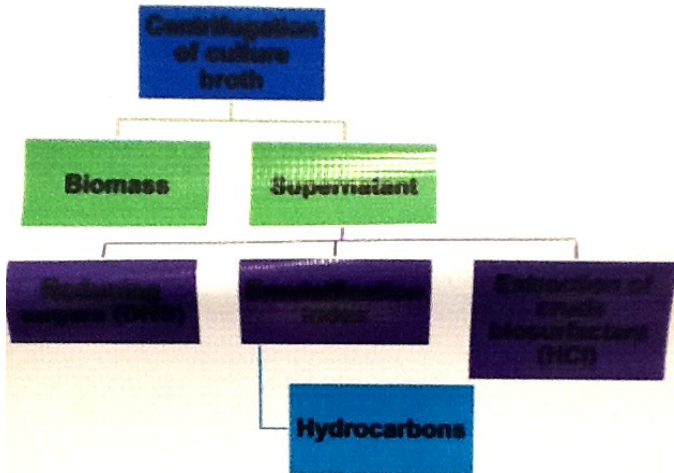


Figure 4. Analytical measurements methodology

4. Results

Experimental results of the three *Pseudomonas* species in blood agars shown a B-hemolysis, so they are a biosurfactant producer strains.



Figure 5. B-hemolysis in blood agar

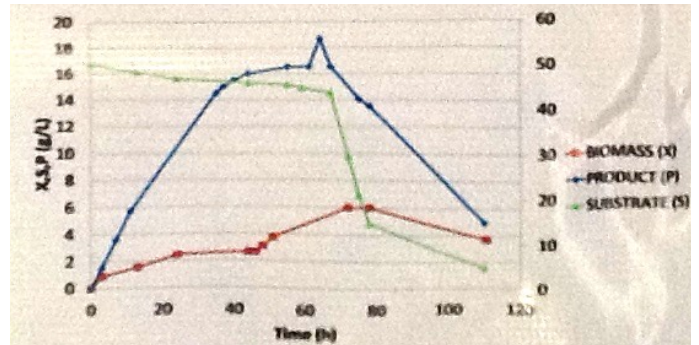


Figure 6. Kinetics of the batch culture of whey with *P. aeruginosa*.

5. Conclusion

The three strains of *Pseudomonas* gave a positive result in the B-hemolysis, so they were considered as producers of biosurfactants and the batch kinetic studies from this culture give us a maximum production of crude biosurfactant of 18.6 g/L and a biomass concentration of 6 g/L, the emulsification indexes were 68%, 8.3% and 10.6% for oil, diesel and gasoline respectively.

Acknowledgements

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Table 1. Results of the proximal analysis

Parameter	(%)
Fat	0.874
Salts	0.480
Solids non fat (SNF)	6.568
Proteins	3.107
Lactose	2.946
Added water	33.563
Temperature (°C)	23.733
Freezing point (°C)	-0.345
Density	24.457



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