in sufficient amount for the commercial exploitation. Therefore, in order to promote the emergence of this industry, it is important to establish recovery methods for polysaccharides production with commercial interest. Actually the main studies for the production of sulphated polysaccharide fractions are carried out using low concentration of HCl with reaction periods times of about 1-3 hours.

The aim of the present work was to evaluate the sulphated polysaccharides (fucoidan) recovery from brown seaweeds by microwave-assisted extraction under different operational conditions. Brown seaweeds species *Fucus vesiculosus* and *Ascosphyllum nodosum* from North Portugal were studied. The extraction reactions were performed according to experimental designs varying the time (1 to 11 min), pressure (30 to 50 psi) and alga/water relation (1/25 to 5/25 g/ml). All the experiments were carried out in a microwave digestion oven MDS-2000 (CEM Corporation). Total sugars content, monosaccharide composition and sulphated content were quantified.

Significant differences ($p<0.05$) were found varying the pressure and time levels, while the alga/water relation did not influence the extraction values in the range of values studied. The highest recovery index was achieved when using 50 psi during 11 min. The maximum yield of sulphated polymer extracted under these conditions was similar to values reported in the literature. Monosaccharide composition analyses showed mainly the presence of fucose and galactose.

In conclusion, microwave-assisted extraction under short reaction times is an effective method in improving polymer dissolution of sulphated polysaccharides from brown seaweeds.

Several empirical correlations were tested (Cooper et al., 1944; Ryu and Humphrey, 1972; Ryu & Humphrey modified; Garcia-Ochoa and Gomez, 1998) and the empirical constants influenced by the increasing agitation speed, aeration flows and apparent viscosities were determined. The empirical correlation that fits better the range of $k_{La}$ values, determined in STR 7-L for Newtonian and non-Newtonian fluids, was the equation proposed by Garcia-Ochoa and Gomez (1998) when was used the porous sparger and the Rushton turbine. The empirical correlation is strongly dependent on the impeller geometry.

**References**


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**[P-I.144]**

**A Kinetics Studies of the Production Rhamnolipids by *Pseudomonas aeruginosa* LAMI from Glycerin**

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**Keywords**: Rhamnolipids; Kinetics; Glycerin

**Introduction**: The kinetics of biosurfactant production exhibits many variations between the several possible systems to be employed, and few generalizations can be made (Desai and Banat, 1997). Therefore, the objective of this work was to evaluate mathematical models for the rhamnolipid, biomass and glycerol concentration to different C/N ratios

**Methods**: *P. aeruginosa* LAMI was isolated from crude oil contaminated soil. Experiments were performed in 250 mL erlenmeyers containing 50-mL of culture media: glycercine 5% (w/v); 0.062 M KH$_2$PO$_4$, 0.2 g/L MgSO$_4$ and pH 7.0. NaNO$_3$ concentrations were 1.0, 1.45 and 4.0 g/L, C/N ratios of 86, 59 and 21, respectively. 2% (v/v) of cells suspension were inoculated and the erlenmeyers were incubated at 37 °C at 150 rpm for 72 hours. Rhamnolipid concentration was determined according orcinol method (Pham et al., 2004). Biomass and Glycerol concentration were determined according to Rocha et al. (2007). Proposed models (Rodrigues et al., 2006) were fitted to experimental data using Microsoft Excel 2007 (solver) by nonlinear regression

**Results**: Figures 1 to 3 show the obtained results during the fermentation using *Pseudomonas aeruginosa* LAMI. The estimated mathematical model parameters are in Table 1

![Fig. 1. Time behaviours of (A) specific rates and (B) biomass, rhamnolipids and glycerol concentrations during the cultivation of *P. aeruginosa* LAMI (C/N≈21).](image-url)
Table 1
Estimated mathematical model parameters obtained by nonlinear regression of biosurfactant, biomass and glycerol concentration data.

<table>
<thead>
<tr>
<th>Biomass production</th>
<th>C/N ratio</th>
<th>( \mu_{\text{max}} (\text{h}^{-1}) )</th>
<th>Xmax (g/L)</th>
<th>YX/g(L)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21</td>
<td>0.183</td>
<td>0.660</td>
<td>0.013</td>
<td>0.9971</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>0.197</td>
<td>0.539</td>
<td>0.017</td>
<td>0.9990</td>
</tr>
<tr>
<td></td>
<td>86</td>
<td>0.200</td>
<td>0.450</td>
<td>0.019</td>
<td>0.9989</td>
</tr>
</tbody>
</table>

Discussion: The time behaviours of specific rates (Fig. 1A) suggest a primary metabolism to rhamnolipid for all experiments. Biosurfactant and biomass concentration were strongly dependent on the C/N ratio, with maximum concentration rhamnolipids of the 1.29 g/L (C/N = 21). Mathematical models describe realistically the experimental data for biosurfactant and biomass concentrations for all experiments. However, the mathematical model proposed for glycerol consumption diverges for C/N ratios of 21 and 59.

References


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A Novel Alcohol Oxidase from Paenibacillus sp. AIU 311 and Its Application
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An alcohol catalyzing conversion of glycolaldehyde to glyoxal was purified to the homogeneous state from Paenibacillus sp. AIU 311, and its properties were revealed.

This enzyme exhibited high activity for aldehyde alcohols such as glycolaldehyde, glyceraldehyde, and aldodetrose, but not for methanol, ethanol, ethylene glycol or glycerol (Isobe et al., 2007; Isobe et al., 2008). The glycolaldehyde oxidation was optimum at pH 6.5 and 50°C. The molecular mass of this enzyme was 49 kDa, and it consisted of two identical subunits of 24 kDa. This is the first report of an oxidase exhibiting high specificity to a hydroxy group of aldehyde alcohols. The AOD gene of Paenibacillus sp. AIU 311 contained an open reading frame consisting of 618 nucleotides corresponding to 205 amino acid residues. The deduced amino acid sequence exhibits a high similarity to that of manganese superoxide dismutases, but not to that of AODs from methylotrophic yeasts, such as Candida and Pichia. We expressed the cloned gene as an active product in E. coli BL21 cells. The productivity (total units per culture broth volume) of the recombinant AOD expressed in E. coli BL21 was 26,000-fold higher than that of AOD in Paenibacillus sp. AIU 311. The recombinant cells had utility for the production of glyoxal from glycolaldehyde.

References

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Production of polyhydroxyalkanoates (PHAs) by Ralstonia eutropha ATCC 17,699 using unconventional substrates
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Keywords: Biopolymers; Polyhydroxyalkanoates; Cassava flour; Rejected bananas

Polyhydroxyalkanoates (PHAs) are biopolymers synthesized by numerous bacteria as an intracellular grain, when they are with nutrient limit conditions. PHAs are biodegradable and environmentally friendly, they could be used for many applications, similar to conventional polymers, depending their structure and chemical composition. However, the only disadvantages that present these biomaterials are the high cost of process, they are more expensive than petrochemical polymers based, for this reasons, the research around the world search innovatory strategies that allow lowing the production cost of PHAs and turning into them in attractive and competitive commodity for the global business.

In this investigation, we evaluated the Polyhydroxyalkanoates production in reactor of 5L from renewable non-conventional raw materials like cassava flour and rejected bananas, using the bacterium Ralstonia eutropha ATCC 17699 able to accumulated large quantities of polymer (up to 80–90% by weight).

Unconventional substrates used are rich in starch hydrolyzed to fermentable sugars, allowing use as a carbon source for production of Polyhydroxyalkanoates and reduce operating costs of this biomaterials and obtain two different biopolymers useful in packaging.

References

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Evaluation of the Production of an Extracellular Alpha-Amylase by a Yeast Isolate
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Keywords: Alpha-Amylase; Yeast Isolate; Enzyme Production; Batch and Chemostat Studies

Amylases are among the most important enzymes used in biotechnological processes. Though amylases originate from different sources, the microbial amylases are the most produced and used in industry. The main purpose of this work was to evaluate the potential of a yeast isolate for the production of an extracellular...