EVALUATION OF THE OPTIMUM TEMPERATURE IN LIQUID FERMENTATION TO THE PRODUCTION OF LIPASES BY *Aspergillus Niger* AT REACTOR LEVEL

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Introduction. The lipases (EC 3.1.1.3) could be the most important enzyme in the group of biocatalysts for biotechnological applications (1). Its ability to develop very specific biotransformation has become very popular in the food industry, detergents, cosmetics, pharmaceutical and organic synthesis (2).

The aim of this work, was to evaluate the production of lipases by *Aspergillus niger GH1*, considering the temperature as the main variation factor using an optimized liquid medium (previous work) at reactor level.

Methodology. The strain used was *A. niger GH1* (DIQ.UAdeC collection). The lipase production was made in 1.5 L Bioreactor (New Brunscwick BioFlo/CelliGen 115) during 216 h. Liquid medium consisting of inorganic salts and olive oil as carbon source. The factors monitored were dissolved oxygen, temperature, pH and mixing; with constant aeration (1 v/v/m). The enzymatic activity assay was done according to *Bastida et al., 1998* (3). One unit (UE) of lipase activity was defined as the amount of enzyme necessary to hydrolyze 1 μmol of pNPP per minute under assay conditions. Biomass was calculated by dry weight at 80 °C for 24 h defined as (g/mL).

Table 1 Variation UE / mL of lipase obtained at different temperatures. Best times (α_1) with larger production (β_1)

Fermentation Temperature (°C)	Constant Aeration (v/v/m)	Time (h) α_1	UE/mL β_1
20	1	192	8.69
		216	8.88
25	1	120	14.67
		168	16.62
30	1	48	20.66
		72	20.51
35	1	168	28.15
		192	28.00

Results. The highest lipase production (Table 1) was at 35 °C with 28.15 and 28.0 UE mL^{-1} at 168 and 192 h respectively. These values are more than 3 times of that achieved at 20 °C, suggesting that the optimal lipase production should be around 35 °C for this strain. Literature mentions values about 29 UE mL^{-1} by *Rhizopus sp.* (4) and 18 and 4 UE mL^{-1} by *R. arrhizus* and *A. niger* respectively (2). The major amount of biomass obtained was 0.017 g/ml at 92 h and 0.0014 at 144 h in the fermentations at 30 y 35 °C respectively. The variation oh pH was $\pm$ 0.5; the supply of O_2 and mixing kept constant and the lecture of O_2 dissolved in the medium has a decrement until 50%.

Conclusion. The temperature determined for a liquid fermentation to get the highest lipase activity production under previously described conditions was at 35 °C. This value could help the process, reducing the time of it and getting the major volume of enzymatic extract; likewise, in this work we obtained important information to a scale-up of this process. Alike, we suggest analyze other factor as aeration and agitation altogether with obtained in this work to increase the production of lipases in a medium liquid.

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