Study of Oxygen Effects on *Thermus sp. RQ-1*

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***Keywords**: Thermophilic bacteria, oxygen transfer, pressure*

Thermophilic microorganisms have potential applications in industry due to high cell growth and enzymatic reaction rates, lower costs in cooling systems, lower susceptibility to contamination, etc [1]. Cultivation of thermophiles can be used in bioconversions, as well as to obtain important thermostable enzymes [2].
Oxygen could be a limiting factor in aerobic thermophilic cultures because of its low solubility in the medium at high temperatures.
In this work, oxygen demand of a culture of a *Thermus* bacteria (strain RQ-1) isolated from shallow hot springs on S. Miguel, Azores [3] was investigated in a batch fermenter at atmospheric pressure and 70 ^{o}C. Oxygen transfer capacity of the system was determinated by measuring the volumetric oxygen transfer coefficient ($k_L a$).
In the initial conditions of operation (200 rpm e 1 vvm) dissolved oxygen was completely exhausted from the medium at the exponential growth phase due the considerably high oxygen up-take rate of the cells. To eliminate oxygen limitation a 2-fold increase on stirring rate was applied.
In order to study the possibility of using increased air pressure to increase oxygen solubility and consequently improve oxygen transfer rate to the medium, a pressurised reactor was used to cultivate *Thermus* RQ-1 cells. It was observed that air total pressure up to 5.6 atm (567.3 KPa) did not inhibited cell growth; on the contrary, cell concentration increased with pressure up to the maximum value used.
Oxygen partial pressure increased by the reactor pressurisation also inducted the activity of the antioxidant enzymes superoxide dismutase (SOD) and catalase, mainly at the exponential growth phase. These enzymes have potential applications on food and pharmaceutical industries.

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