

Title: EVALUATION OF THE NITROGEN SOURCE USED FOR THE PRODUCTION OF SURFACTIN-LIKE *BACILLUS* SP. H2O-1

Authors: Guimarães, C.R¹; Araujo, L.V¹; Freire, D.M.G¹

Affiliation: ¹UFRJ – Universidade Federal do Rio de Janeiro (Instituto de Química, Av. Athos da Silveira Ramos, 149, Bloco A-549-1, 21941909, Rio de Janeiro-RJ)

Abstract:

Biosurfactants are compounds of microbial origin, derived from the metabolism of bacteria, yeasts and filamentous fungi. These molecules are characterized by their surfactant activity and have some advantages towards chemical surfactants, like low toxicity, high biodegradability and synthesis from renewable sources. One of the most studied and efficient types of biosurfactant is surfactin, a lipopeptide produced by various *Bacillus* species. The structure of the surfactin, as well as their concentration is directly related to culture conditions and nutrients used in the culture medium. The structural difference can lead to changes in biological activity of surfactin. Thus, the objective of this study was to evaluate the production of surfactin-like from *Bacillus* sp. H2O-1 using three different nitrogen sources: ammonium sulfate, ammonium nitrate and sodium nitrate. *Bacillus* sp. H2O-1 was incubated in a rotary shaking at 170 rpm and 30 °C for different times. The physicochemical properties of the molecule (surface tension, interfacial tension, CMC and DMC) were analyzed at the time where a higher concentration of surfactin-like was reached. In the experiments carried out with (NH₄)₂SO₄ and NH₄NO₃ as the sole source of nitrogen, the strain of *Bacillus* sp. H2O-1 produced 511,7 and 659,5 mg/L of surfactin-like, respectively, after 24h of growth, showing similar physicochemical properties. However, in the fermentation process with NaNO₃ as the sole nitrogen, 47,9 mg/L of surfactin-like was reached at 96h. The production of surfactin is most often associated with the growth of *Bacillus*. Therefore, all parameters that affect the growth of the microorganism, such as nitrogen availability, can directly affect the production of the molecule. The higher production obtained with (NH₄)₂SO₄ and NH₄NO₃ can be explained by the presence of ammonia in these compounds. The microorganisms assimilate directly this molecule, which is then used for the synthesis of their nitrogen compounds. On the other hand, when nitrate is used as the sole nitrogen source, it is necessary, firstly, reduce it to ammonia. Therefore, the nitrate assimilation is slower, leading to a low cell growth and, hence in the case of NaNO₃, low production of the lipopeptide. The results show the importance of evaluating the most appropriate source of nitrogen for the production of surfactin-like in order to obtain higher concentration of this molecule.

Keywords: surfactin-like, *Bacillus* sp. H2O-1, nitrogen source

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