

Title: APPLICATION OF THE KERATINASE OF *ASPERGILLUS SULPHUREUS* URM 5029 IN LAUNDRY DETERGENT FORMULATIONS

Authors SOUSA, M.A. ¹, RÊGO, M.G.C. ¹, SOUZA, O.C. ¹, FARIAS, C.M.M. ¹, MACIEL, M.H.C. ¹, SOUZA-MOTTA, C.M. ¹

Institution ¹ UFPE - Federal University of Pernambuco (Av. Prof. Nelson Chaves, s/n, Cidade Universitária, Recife/PE), ² University of São Paulo (Av. Prof. Lineu Prestes 580, Bl. 16, São Paulo, São Paulo/SP)

Abstract

Microbial proteases represent one of the three largest groups of industrial enzymes and have applications in a range of industrial and household products, including detergents, food industries, leather, silk and pharmaceuticals. Literature research shows that alkaline proteases are key ingredients in detergent formulations. One application of keratinase in detergents is their use as an additive for cleaning drains clogged with keratin waste and also to improve the washing performance of detergents for enzyme-based clothing. The parameters for selecting of an optimal detergent protease are the compatibility with the components of the detergent, good activity at pH and wash temperature. The aim of this study was to explore the possible application of keratinase produced by *A. sulphureus* URM 5029 in laundry detergent formulations. To confirm the potential of keratinase as a detergent additive, its compatibility and stability were examined in aqueous solutions of detergent (7.0 g/L to stimulate washing condition). The detergents and enzyme were mixed in a ratio of 1:1 (v/v), incubated at 37°C for 1h, 2h and 3h, followed by measurement of residual activity and compared with the control. The residual activity was expressed in percentage activity, considering the control activity 100%. The keratinase of *A. sulphureus* URM 5029 retained 17.27 to 140.75% of its original activity with the detergents for clothes tested in different concentrations (1.0 to 14.0 µg/mL), presenting the highest residual activity in the concentration of 9.0 µg/mL. The stability of any enzyme is influenced by the ingredients of the detergents, therefore, the partial loss of keratinase activity of *A. sulphureus* URM 5029 in some of the laundry detergents may be attributed to inhibitory effect of detergent component such as anionic surfactants, bleaching agents and stabilizers. On the other hand, some of the components of the detergents have stimulatory effects on protease activity that may be responsible for enhancing the enzymatic activity in the presence of these detergents compared to control. Furthermore, it was observed that the enzyme was stable at different incubation times in most commercial detergents tested, demonstrating having stability for long periods of time, important characteristic for its use in laundry detergents. Therefore, the compatibility and stability *A. sulphureus* URM 5029 in the presence of surfactants, oxidizing and bleaching agents vouches its candidature for application in laundry detergent industry because detergents contain these ingredients for improving its wash performance.

Keywords: Application, Compatibility, Stability, Detergents, Keratinases.

Funding Agency: CAPES; FACEPE.