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**Application of a  $\gamma$ -polyglutamic acid flocculant to water treatment**

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Gamma-polyglutamic acid ( $\gamma$ -PGA) has received considerable attention for environmental applications.  $\gamma$ -PGA can be produced by fermenting soybeans using the bacterium *Bacillus subtilis* found in foods such as natto (Figure 1), which is considered a delicacy in Japan. Most biopolymer applications are directly linked to their potential to respond to changes in the environment in which they are dissolved. An approach aimed at understanding the structural changes, conformation and associations of polymer chains, as well as their practical applications, is of great scientific interest. This work focuses on the extraction and quantification of  $\gamma$ -polyglutamic acid from natto, a fermented soybean food. The  $\gamma$ -PGA extraction method using methanol proved to be more efficient than extraction with ethyl alcohol and acetone. The extraction of  $\gamma$ -PGA using methanol yielded 4.72 g kg<sup>-1</sup> of natto. After, a conventional jar test apparatus was used for flocculation experiments. The commercial coagulants used in the coagulation-flocculation-sedimentation tests were aluminum sulfate (16% Al<sub>2</sub>O<sub>3</sub>) and PAC (9.59% Al<sub>2</sub>O<sub>3</sub>). The levels of coagulants were established based on preliminary tests and recommended by the WTP, but the parameters of pH and temperature of the raw water were not changed. The optimum operating conditions for bioflocculant treatment were determined by the jar test procedure and, in this case, the  $\gamma$ -PGA was used directly in its powder form for the jar test. The tests were performed using raw water from the Salto de Pirapora Water Treatment Plant (WTP) in the state of São Paulo, Brazil. The performance of PGA bioflocculant was superior to that of the other coagulants. In the dry season, 65 mg L<sup>-1</sup> of new formulation  $\gamma$ -PGA removed 93.12% of apparent color, and residual turbidity was 3.38 NTU.

**Biography**

Valquiria Campos is a B.Sc. in Geology at University of São Paulo; D.Sc. in Geology at Geoscience Institute at the São Paulo University and she held Postdoctoral in Chemical Engineering at São Paulo University. A full Professor since 2009 at São Paulo State University (UNESP), Institute of Science and Technology, Sorocaba, Brazil. The actual laboratory in which she is working is in the Department of Environmental Engineering of the Polytechnic School. She is focused on understanding hydrogeochemistry processes and related impacts on water supply and demand, water quality, agriculture, and impacts to other sectors of society.

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