

**TITLE:** CASSAVA STARCH WASTEWATER pH STABILIZATION PRE-TREATMENT USING OYSTER SHELLS FOR BIOGAS PRODUCTION

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**ABSTRACT:**

The cassava crop is responsible for the production of flour and starch, which generates large amount of waste. The cassava starch wastewater (CSW), also called manipueira in Brazil, when improperly disposed can contaminate the soil and watercourses due to the presence of high organic load. Thus, this residue has been used in several ways, such as animal feed, fertilizers, and nowadays for biogas production from anaerobic digestion (AD). However, due to its rapid acidification, new technologies are needed aiming the pretreatment of this residue in order to optimize the biogas production. In this sense, the CSW acidity adjustment is usually performed through the dosing of chemical reagents, which impairs the pretreatment economic performance. Therefore, this study proposed the use of calcium carbonate present in oyster shells, aiming to reduce operational costs and reuse this waste in order to decrease environmental pollution. In this segment, the oyster shells were crushed and separated in the granulometry range of 18-25 mesh, 30-35 mesh and 40-50 mesh, to evaluate different intervals' performance. The reaction stabilized after 6 h, and the 18-25 mesh oyster shells had pH  $5.7 \pm 0.1$ , while the 30-35 and 40-50 mesh increased the pH from  $4.5 \pm 0.1$  to  $6.2 \pm 0.1$ , however the 30-35 interval was the most stable. This value is close to the ideal conditions (pH 6.5 – 7.8) for anaerobic bacteria development. Besides that, the sewage sludge was used as an important source of microorganisms for biogas production. So, 240 mL of the filtered CSW was inoculated with 120 mL of the sludge in an anaerobic stirred tank batch reactor for 21 days, in  $37 \pm 1$  °C. It was possible to notice the stabilization in biogas production after the 19<sup>th</sup> day of both raw and pre-treated CSW digestion. The raw effluent (pH  $4.5 \pm 0.1$ ) produced 145 mL of methane after 21 days, while the pre-treated CSW (pH  $6.2 \pm 0.1$ ) produced 185 mL in the same period, increasing the accumulated methane production in approximately 11%. Thus, it was observed that carbonate supplementation in oyster shells probably prevented accumulation of fatty acids through bicarbonate ions resulting from the calcite dissolution, affecting positively the biogas production.

**Keywords:** Cassava wastewater, Oyster shells, Calcium carbonate, Sewage sludge, Biogas

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