

**Title:** BACTERIAL CONTAMINATION CONTROL USING POLY QUAT BIOCIDES IN INDUSTRIAL PROCESS OF ETHANOL PRODUCTION.

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**Abstract:**

Bacterial contamination is a big problem for ethanol plants. The main contaminants are bacteria of the genera *Lactobacillus*, *Bacillus* and *Leuconostoc*. This contamination can cause damage such as pipelines obstruction due dextran production, flocculation and decrease yeast viability and fermentation yield reduction. There are many selective antimicrobial agents, however these may select resistant bacteria, requiring each time larger doses, increasing production costs and causing numerous damage to the environment. In this context, Poly Quat biocide (Poly Sell Prod. Chemicals Product Ltd.), formulated with quaternary ammonium, was tested at 15ppm concentration, applied after heat exchanger in pipe rings that feed fermentation tanks, for microbiological control in alcohol industry. Samples were collected from the mixed juice, heat exchanger (input and output) and pipe rings that feed the fermentation vats. Total bacteria number was quantified by plating on MRS medium and acid bacteria in MRS medium with 0.8% calcium carbonate, before and after application of Poly Quat. Mixed juice samples showed contamination around 10<sup>8</sup> CFU/mL. Contamination levels decrease during broth route due to the heat treatment. But treatment with hot broth could damage the structure of the plant, besides be necessary cooling period of the broth to add the yeast. In and out of the heat exchanger contamination was controlled around 10<sup>2</sup>CFU/mL, in the pipe rings contamination increased to 10<sup>6</sup> CFU/mL. Poly Quat decreased bacterial contamination from 10<sup>6</sup> to 10<sup>3</sup> CFU/ml in 2 hours. Bacterial contamination dynamics in the process of this plant and Poly Quat biocide effect for 6 hours of continuous dosing were observed. Biocide controlled bacterial growth in 99%. In mixed broth L-lactic acid production reaches 5.1 mmol / L, for this production, bacteria consume about 1.74g sucrose / L, representing loss of about 280L of ethanol per fermentation tank. Biocide used decreased the production of this acid by about 50% in pipe ring. Poly Quat, dosed in the pipe rings that feed the vats, showed great effectiveness as a bactericidal agent when applied in the industrial process of ethanol production.

**Keywords:** Poly Quat, biocide, alcoholic fermentation contaminants

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