Combination effects of ultrasound wave and biocide treatment on the growth of sulfate reducing bacteria (SRB)

Rosilawati Mohd Rasol, Norhazilan Md Noor*, Nordin Yahaya, Arman Abdullah, Akrima Abu Bakar, Ahmad Safuan A. Rashid

Faculty of Civil Engineering, Reliability Engineering and Safety Assessment Research Group (RESA), Universiti Teknologi Malaysia, Skudai 81310, Johor, Malaysia
Email: norhazilan@utm.my

ABSTRACT

Microbiologically influenced corrosion (MIC) is caused by the presence of sulfate-reducing bacteria (SRB) and is of great concern to the heavy metal industries. Inhibitors and biocides are commonly used to control the problem. Nevertheless, the solutions are too expensive and may create environmental problems by being corrosive to metals. Ultrasound wave exposure is one of the potential alternatives to biocides for the mitigation of MIC risk in pipeline system. In this work, a combination of ultrasound wave and green biocides of glutaraldehyde and ethanol has been proposed to exterminate SRB in a medium. An amount of 100 ml of *Desulfovibrio vulgaris* (ATCC7757) broth number 1249 was grown in 125 ml anaerobic vials at 37°C for one day followed by exposure to various mitigation methods. Results from the study show that a combination of ultrasound and biocide can effectively reduce the dosage of biocide during corrosion treatment. The effectiveness of mitigation based on ultrasound-biocide combination is better than the treatment based solely on biocide whereby the extermination of SRB was found 10 times more effective according to the reduction of cell numbers of planktonic's SRB. Ultrasound technique can provide a feasible alternative as an effective assist to chemical inhibitors and biocides for controlling MIC in a more eco-friendly manner.

Keywords: Sulfate-reducing bacteria; Ultrasound wave; Green biocide mitigation

*Corresponding author.