



Evaluation of Biocide Efficacy by Microcalorimetric Online Monitoring of Bacterial Activity in Biofilms

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INTRODUCTION

In a process known as biofouling microbial cells are embedded in a matrix of extracellular polymeric substances (EPS) and form a slimy layer on surfaces, i. e. a biofilm, causing corrosion of constructional materials, heat loss in heat exchangers, or the decrease of product quality as in the paper industry (1, 2, 3). In a biofilm matrix bacteria are largely protected against toxic substances such as antibiotics or biocides and the efficacy of their application cannot be as easily investigated as the treatments against free (planktonic) microorganisms [4]. Therefore, and since the costs for countermeasures against biofouling are high, there is obviously a need to use methods for evaluation of their efficacy in order to select antibiofilm compounds and to determine the appropriate dosage of application.

For this reason a microcalorimetric online test to directly determine microbial activity of unaltered, intact biofilms [5] was developed. This method allows to test the efficacy of antibiofilm agents as has been demonstrated in experiments with biofilms consisting of sulfate reducing (SRB) and chemoorganotrophic (COT) bacteria treated with a commercial biocide with glutaraldehyde as one of the active compounds (GLU). The investigated biofilms were produced in continuous culture on the surface of the flow-through gold tubing measuring cylinder of the calorimeter and, thus, online monitoring of changes in microbial activity during biocide treatment was possible.



Figure 1. View of a flow-through calorimetric unit.