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**AN EVALUATION OF BIOCIDES TO CONTROL MICROBIAL
CONTAMINATION OF HYDROCARBON FUELS, INCLUDING BIOFUELS AND
THEIR BLENDS.**

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Hydrocarbon fuels are known to be susceptible to microbial contamination during their storage due to the introduction of water into fuels (e.g. through condensation). At the water-hydrocarbon interface, conditions are favourable for the growth of micro-organisms which often contaminate fuels. Biofuels and commercial biofuel blends, such as B5 have a higher susceptibility to microbial contamination and a higher incidence of reported microbial contamination issues.

Uncontrolled growth of microorganisms can on one hand damage the equipment through increased corrosion and on the other reduce the fuel quality. Reduced fuel quality can lead to clogged filters, poor engine performance and in heavily contaminated systems it may also develop a foul odour. Biocides can be used as part of a fuel management system to control microbial contamination, maximize long term fuel storage and to minimize fuel biodegradation.

Four biocides, CMIT/MIT (a mixture of 5-chloro-2-methyl-4-isothiazoline-3-one and 2-methyl-4-isothiazolin-3-one), 4-(2-nitrobutyl)-morpholine, 4,4- dimethyloxazolidine and 2,2-dibromo-3-nitrilopropionamide were screened in six different hydrocarbon fuels; a diesel fuel, a B100 biodiesel, a B5 diesel, light heating oil, marine diesel and a heavy fuel. Testing used three test microorganisms; *Pseudomonas aeruginosa*, *Hormoconis resinae*, and *Yarrowia tropicalis* and was based on the methodology outlined in ASTM E1259-05 "Standard practice for evaluation of antimicrobials in liquid fuels". In addition, no harm data was generated according to EN 590 to confirm that the biocides have no detrimental effect on the fuels being treated with these biocides.

With the wide variety of biofuels being used six different fuel types were used to profile biocide performance. CMIT/MIT, 4,4- dimethyloxazolidine and 2,2-dibromo-3-nitrilopropionamide were all very effective biocides in all the fuels tested. 4-(2-nitrobutyl)-morpholine gave mixed results suggesting it is effective in diesel fuels but not in the samples of biofuels or the B5 biofuel blend used in this test. When selecting a biocide to use in a hydrocarbon fuel it is advisable to assess the biocide performance using a suitable test method, such as ASTM E1259, as reported in this paper.