

Pouring oil on troubled waters

Tecan's Infinite® M1000 PRO multimode reader has helped Aqsens to develop a portable testing platform for on-site quantitative monitoring of polymeric scale inhibitors in oil field-produced waters.

AQSENS[®]
REDEFINING LIQUID ANALYSES

Scientists at the Aqsens R&D site in Turku, Finland, are focused on developing assay chemistries and portable readers for environmental monitoring, clean technology and life sciences applications, with an initial emphasis on the oil industry. Using its expertise in liquid fingerprinting, the Company has established the AQSENS™ Q-technology platform, offering quantitative and qualitative analysis of liquids or dissolved solids. This versatile technology is ideal for industries requiring rapid, accurate on-site analysis, and forms the basis of the recently launched KemSens™ SI – developed in collaboration with Kemira Oyj – a rapid, portable testing platform for monitoring residual scale inhibitors in oil field-produced waters.

The oil industry depends on chemical inhibition to minimize scale deposition in

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oil field-produced waters, and must actively perform monitoring of residual scale inhibitors. Analysis is traditionally a lengthy procedure, requiring complex equipment, which is performed off-site. Inevitably, the time taken to transport samples to the laboratory causes a delay in reporting the results. The AQSENS QS system is designed to overcome these issues, and Tecan's Infinite M1000 PRO reader played a key role in its development, as Joonas Siivonen, Application Scientist at Aqsens, explained: “During the oil extraction process, a large volume of water is produced. Depending on the composition of this water, there can be a build-up of scale in the piping, increasing the pressure and potentially creating a blockage. Polymeric scale inhibitors are used to prevent this happening, and the residual levels in the oil field-produced waters must be monitored to ensure treatment is effective, enabling safe operation of the oil platform. However, oil fields are usually in difficult to reach locations; it can be up to two weeks before samples reach the laboratory, and a further couple of weeks before the results are received. Data quality can also be compromised, as the people taking the samples are not performing the analysis, increasing the likelihood of samples being mixed up. In addition, traditional laboratory



Joonas Siivonen and Satu Tiittanen using the Infinite M1000 PRO



methods struggle to achieve the sensitivity needed; scale inhibitors remain active well below current detection limits.”

Joonas continued: “We developed the portable AQSENS QS platform to help overcome these issues, using a patented detection technology combining time-resolved fluorescence (TRF) with chemical modulators. In the early development stages, we relied on a rented plate reader. However, this did not have enough sensitivity for our assay – we could not perform testing at the low concentration ranges necessary for monitoring residual scale inhibitors – and the cost of renting was also relatively high. We decided to purchase our own reader and, initially, looked at filter-based readers, assuming that monochromator-based readers would

not be sufficiently sensitive. However, after speaking to the Tecan distributor in Finland, our opinion changed. The technical knowledge of the Finnish sales team was excellent; in just one phone call, they described the capabilities of the Infinite M1000 PRO to us in perfect detail. We knew straight away that it would meet our needs, helping us to develop both the assay chemistry and a TRF reader for use in the field.”

“The Infinite M1000 PRO has proved more sensitive for our applications than most filter-based instruments, and also gives us additional flexibility. The ability to control the gain setting is a really big bonus, allowing us to adjust the instrument’s sensitivity and detect TRF signals at a much lower level than was previously possible. The Infinite M1000 PRO

has also enabled us to determine the optimum wavelength and measurement settings for our chemistries, establish manufacturing specifications for our TRF reader, and validate the assay protocols. The final product, using the AQSENS QS platform, offers oil producers a fast, accurate means of monitoring residual scale inhibitors on site. Sample transfer is eliminated, reducing the likelihood of a mix-up, and the results are available in around 15 minutes, which is a huge difference compared to off-site laboratory testing. Sensitivity is improved too, and residual scale inhibitor concentrations as low as 1 ppm can now be detected,” concluded Joonas.

To find out more about Tecan’s Infinite M1000 PRO reader, visit www.tecan.com/infinitem1000



The AQSENS QS system offers rapid, portable testing within 15 minutes



The system combines TRF with specific chemical modulators

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