

Monitoring waste water releases from oil and gas plants and refineries by simultaneous absorbance spectra and fluorescence excitation-emission mapping

Adam Gilmore, Michael Oweimrin

HORIBA Instruments Incorporated, USA

Recently, the issue of waste water effluent from oil and gas plants and refineries has resurfaced in the news and the political atmosphere as an area of concern for our well-being **as well as for our environment's overall health. Therefore, it is essential** that the waste water that is released from these plants be treated with the utmost care and monitoring while abiding by the various rules and regulations in place. The key to successfully meeting **these requirements lies in the treatment plant's ability to** deal with often dramatic source-water variations in natural organic matter (NOM) content and biodegradable matter, amongst others. Whereas the regulated levels of NOM must be determined by measuring total organic carbon (TOC), often this parameter does not provide rapid or cost-effective qualitative or quantitative assessment of the various humic, fulvic and other aromatic NOM components. However, two main optical techniques namely UV absorbance and fluorescence excitation-emission mapping can be used for rapid assessment with precise identification of humic and fulvic components. This study presents data from a new type of instrument which simultaneously measures the UV-VIS absorbance spectrum and EEM. The rapid absorbance-EEM is facilitated by a single system that is more than 100 time faster than conventional scanning absorbance and fluorescence optical benches. The new system can continuously collect EEMs and absorbance spectra at a rate often greater than 1 per min with the extra capacity to monitor the UV254 absorbance and fluorescence emission spectrum excited at 254 nm in 4 ms intervals (an equivalent scan rate of 5.5 million nm/min). The EEM spectral data is corrected for all instrumental response factors including concentration dependent inner-filter effects. The accumulated EEM data sets can be modeled using conventional peak identification, PARAFAC and or PCA analysis of the fractionated samples to predict the trihalomethane forming potential (THMFP).