

Evaluation of a Novel and Green Online COD Monitoring Technology for Canadian Pulp Mill Effluents

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A novel and environmentally friendly method to measure soluble Chemical Oxygen Demand (COD), with online capability and a smart decision support system, has recently been developed by MANTECH. The photoelectrochemical Chemical Oxygen Demand (peCOD) technology is based on a UV-activated nanoparticle TiO_2 photocatalyst that utilizes a powerful oxidizing potential to ensure that virtually all organics will be fully oxidized giving a true measure of COD. The peCOD offers a unique and green approach that overcomes the use of mercury, dichromate and concentrated acid with the ability to generate results within a 15-minute time frame.

FPInnovations conducted an evaluation of the manual peCOD analyzer for several effluents from Canadian kraft and mechanical pulp mill operations. The peCOD method was applied in conjunction with the dichromate COD method for comparison. Since the peCOD analysis is done on filtered samples, it was important to understand the impact of varying effluent solids on total COD. Standard dichromate COD testing demonstrated that the effluent solids represented less than 2% of the total COD. In terms of reproducibility of the peCOD technology, the testing indicated that the method showed excellent reproducibility between triplicate analyses. The correlation of the manual peCOD and dichromate COD method, for all effluent samples (i.e., primary or secondary treated, kraft, TMP or BCTMP operations), demonstrated very good correlations with r^2 values between 0.92-0.99. An evaluation of the online peCOD method, measuring COD on a 30-minute cycle in a recirculation tote, is currently under evaluation for a primary TMP and primary kraft mill effluent. The results from the online peCOD testing will be reported in the presentation.

In a full-scale application, a Chilean Mill recently employed a manual peCOD unit to provide accelerated results to process engineers 8 times faster than the dichromate COD method. This led to a reduction in hypochlorite used for bleaching resulting in lower organics discharge to the wastewater plant and subsequent reductions in chemicals and energy used for treatment. At this site, the total savings over 12 months amounted to \$3 million dollars.