Photolytic Degradation of BTEX from the Oil and Gas Industry

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In 2010 we established that UV light can destroy BTEX effectively, although the energy requirements are considerable. We developed a model that predicts the experimental results for benzene well. The model predicts that pre-mixing ozone will reduce energy requirements substantially. In 2011 we will test this model prediction experimentally. We will also investigate the photolysis of mixtures of BTEX experimentally, to test if the benzene degradation efficiency is affected by the presence of toluene and xylene.

We will develop a model for the degradation of H2S by UV light and test it experimentally.
In 2010 we conducted some modeling of condensation of BTEX, a likely pre-treatment of glycol dehydration effluents before the UV treatment. In 2011 we will refine the model and compare it with field data. The result of this comparison will determine the need for further field measurements with a CEMS type system.

If funding from NSERC can be secured, we will conduct

more in-depth model validation by investigating the photolysis of by-products, developing models for BTEX other than benzene, and mixtures. Such funding will also increase the extent of field work that can be carried out in the project.

The industry will have access to technology to reduce emissions of benzene and other hydrocarbons. We will provide models that can make projections of benzene degradation efficiency for a user-defined energy input and waste gas stream. We will also provide cost estimates. Based on the know how that is obtained, it will be relatively easy to address future needs (e.g., feasibility of application to other waste gas streams) because the reactor model and much of the chemistry of the application will already be available.

Benzene emissions from glycol dehydration units have dropped more than fourfold since the 1990s, but there has been no significant drop in the last five years in spite of a policy drive to achieve such reductions. The UV technology will make further reductions feasible.
Condensation technology for the reduction of BTEX emissions from glycol dehydration units is accepted only slowly because the effectiveness is variable, and poorly established. The project will allow for better predictions of the effectiveness of such technology.

Report

2008 Presentation

2009 Presentation

2010 Presentation