

## Abstract

Large-scale combustion experiments with amount of material burned in the 100-kg range were performed in the TOXFIRE project to provide results as close to real scale as possible for comparison with results from the smaller scale measurements in the project. The real challenge was to achieve conditions yielding under-ventilated, i. e. oxygen-depleted, combustion. Most of the large-scale experiments were carried out in the ISO 9705 room. A few tests were performed in a larger scale test facility built to allow real storage configurations.

Fourier Transform InfraRed spectroscopy (FTIR) was the major technique used to characterise the smoke gases. This report gives a detailed account of the instrumentation, calibration, measurement strategy and method for evaluation of the IR-spectra. Advantages with FTIR are the ability to measure several gases simultaneously and to obtain time resolved concentrations. The evaluation program used presented the concentrations information on-line during the tests. The FTIR equipment was calibrated for the major gases expected to be found in the smoke gases from the different materials tested. The gases calibrated for were CO<sub>2</sub>, CO, HCl, HCN, NH<sub>3</sub> and SO<sub>2</sub>. Also H<sub>2</sub>O was calibrated for, as this is a major combustion product and severe spectral interference is caused by the strong absorbance of water. Univariate peak-height calibration-algorithms were used in the quantitative evaluation of the smoke gas spectra. The calibration algorithms handled interference from H<sub>2</sub>O and from CO<sub>2</sub> in cases where needed.

The sampling of the smoke gases was made directly in the opening of the test enclosure. The idea was to enable measurements of the original combustion products, before any after-burning had taken place.

Generally, valid and interesting chemical information was extracted from the FTIR measurements. The feature of time resolved data from the FTIR turned out to be of great benefit for the assessment of the combustion processes studied. In many cases only short periods of constant ventilation conditions were found. The concentration data from the FTIR measurement could then be evaluated for these periods, which gave very valuable information.