

EUPHORE Chamber

The experiments were performed in a 204 m³ hemispherical reactor made from FEP (fluorinated ethylene propylene) foil of 0.127 mm thickness (Du Pont) and a volume of approximately. The chamber is surrounded by a retractable steel housing, which can be opened or close to control the time of exposure to sunlight. The housing also serves to protect the chamber from rain and strong winds. The floor of the reactor consists of aluminium panels covered with FEP foil and has a specially designed cooling system to compensate for heating of the chamber caused by solar irradiation. Two high-powered mixing fans, located on the floor of the chamber, are used to ensure the homogeneous mixing of reactants and products. Inlet and outlet valves, also located in the floor of the chamber, allow air to be flushed through the chamber for cleaning.

The main feature of the chamber is an optical arrangement that enables in situ measurements to be made by FT-IR spectroscopy. The long-path system consists of a White cell with a base length of 8.17 m and a maximum possible pathlength of 653.6 m. The mirrors (diameter 406 mm) are gold coated to ensure maximum reflectivity in the infrared region. The FT-IR spectrometer (Nicolet Magna 550) is positioned on a platform beneath the chamber. Transfer optics, located in the sample compartment of the spectrometer, are used to guide the infrared beam into and out of the chamber. The spectrometer and transfer optics are flushed with dry air to remove water vapour. Other analytical instruments, including a gas chromatograph (Fisons 8160), gas chromatograph-mass spectrometer (Varian Saturn 2000), NO_x analyser (Eco-Physics Alppt 770) and ozone analyser (Monitor Labs ML 9810) are mounted on a platform under the chamber floor. These instruments are directly connected to the chamber via Teflon sampling lines. Temperature and humidity inside the chamber are measured continuously using PT-100 thermocouples and a dew-point mirror system respectively.