Removal of low concentration contaminant species using photocatalysis - DTU Orbit (30/12/2018)

Removal of low concentration contaminant species using photocatalysis: Elimination of ethene to sub-ppm levels with and without water vapor present

A photocatalytic model reactor system has been devised to assess the capacity and feasibility of a photocatalytic unit for the removal of trace amounts of organic contaminants in air. Realistic operating conditions are applied, and a mathematical model based on Langmuir–Hinselwood adsorption permits the capacity of the removal unit to be extrapolated to extreme operating conditions. A radial flow reactor system allows parameters such as gas velocity, contaminant concentration and relative humidity to be accurately controlled. Ethene photooxidation in fruit containers is studied as an example of application. A runaway ethene production from a full shipment of fruit in a 40' container can be prevented from a starting ethene concentration of 0.5 ppm with a few m² of the porous photocatalyst at a 254 nm irradiance of 37.5 mWcm⁻².

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