



Original thinking... applied

Phototransformation of Chemicals in Water - Direct Photolysis Test

The purpose of this test is to investigate the potential effects of solar irradiation on a chemical in water.

The test is designed to determine the rate and route of degradation of a chemical as a result of direct photolysis. The degradation kinetics and half-life of chemical will be determined, and transformation products and pathways investigated.

The test is based on a tiered approach with each tier triggered by the results of the previous tier.

At Tier 1 (theoretical screen), the maximum possible direct photolysis rate constant for the test chemical in the near surface of clear natural water is estimated. The corresponding half-life is then determined. If the half-life is ≤ 30 days, the test proceeds to Tier 2.

At Tier 2 (experimental study), buffered pure water is exposed to artificial sunlight via a filtered xenon arc lamp. The rate of decline in the concentration of the test chemical and corresponding photolysis rate constant are then determined. This enables the estimation of the half-life of the chemical under summer sunlight in the near surface of a clear body of natural water.

If this half-life is ≤ 190 days, the rate of formation and decline of major transformation products of the chemical will be determined, and their identities investigated.

In addition, the determination of quantum yield may be carried out following Tier 2. The first-order rate constant for direct phototransformation and thus the lifetime of a test chemical in water can be calculated from the quantum yield. Quantum yield can therefore be input into computer programs to help estimate direct photolysis rates and half-lives for the test chemical applicable to any types of surface waters, seasons, and latitudes of interest.

Test guidelines and references

OECD Guidelines for the testing of chemicals Test No. 316: Phototransformation of Chemicals in Water – Direct Photolysis .

U.S. EPA. Direct Photolysis Rate in Water by Sunlight (OPPTS 835.2210).

U.S. EPA. Indirect Photolysis Screening Test (OPPTS 835.5270).

FERA'S WORK IN ENVIRONMENTAL FATE AND METABOLISM

Environmental fate studies play a crucial role in providing the data which supports chemical companies in completing thorough environmental risk assessments.

Fera's support and expertise helps chemical companies to achieve successful product registrations and operate ongoing due diligence. Our environmental fate studies include a range of regulatory compliant tests to assess the biodegradation of chemicals in soil and water, and we provide a range of services from single studies to complex, whole programmes, including dossier preparation and submission.

Fera's multidisciplinary teams combine decades of agrochemical and veterinary drug industry experience with world-class technical expertise and analytical capabilities.

We operate in GLP-compliant facilities in the UK and provide regulatory compliant studies for submission in all geographic regions.

MORE ABOUT FERA

Fera is based at the National Agri-Food Innovation Campus near York, UK.

We work closely with plant protection and veterinary medicine product manufacturers to help develop effective, sustainable and safe chemical products that minimise ecosystem impacts and pollution, while maximising the beneficial effects for crops, plants and animals.

Combining the extensive expertise of our scientists with advanced resources and GLP-compliant laboratories, we provide valuable support to companies in their chemical evaluation and registration efforts.

GET IN TOUCH

For more information and to book a test, call Fera on +44 (0)300 100 0321, email sales@fera.co.uk or visit www.fera.co.uk/chemical-regulation

