

## ENVIRONMENTAL EXPOSURE ASSESSMENT UNDER REACH

Piloting branch- and product-related emission estimation tools for manufacturers, importers and downstream users

### Tool for Textile Dying and Finishing

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#### The REACH Requirement

Under the REACH regulation, manufacturers and importers of dangerous substances (above 10 t/a) have to describe the conditions of safe use and to communicate these to their customers. For that purpose the manufacturer has to define suitable exposure scenarios<sup>1</sup> and to carry out an exposure assessment for the whole life cycle of his substances. The direct customer and his subsequent customers each have to implement the conditions and measures communicated to them, or to adjust the scenario under their own responsibility, respectively.

#### The Challenge

Implementation of these requirements may be a difficult task for industry, due to a number of reasons:

- Manufacturers often do not know much about the uses and the conditions of use in their markets, in particular regarding uses beyond their direct customers. Also, the information available from EU and OECD Documents is not recognised and used by manufacturers yet.
- Many Downstream users are used to comply to emission limit values (if existing) but lack expertise and skills to carry out systematic exposure assessment and risk characterisation for all substances they handle.
- All actors in the supply chain do not yet have a common language and standard procedures to communicate on product safety up and down the chain.

#### The Approach

The German Federal Environmental Agency (UBA) has initiated two R&D projects aiming at the development of easy to use, IT supported tools. The tools are designed in a way that suppliers and users can contribute information on the conditions of use consecutively into a common framework. The branch-specific tools are developed in close co-operation with the respective industry sectors: textile finishing, plastic additives and photochemicals. The tools can be easily adjusted to the needs of other sectors since they are based on a set of generic formulas and a set of determinants for emissions:

- Amount of substance handled per day or year at a site or contained in a product
- Emission factor driven by the technical conditions of use (characterised by a number of life-cycle-stage or branch specific determinants)
- Emission reduction by on-site abatement or product integrated safety measures
- Emission reduction by external risk management measures, like municipal waste water treatment

The tools are designed for emission estimates, but they both include exposure assessment and risk characterisation for the water compartment. This is to illustrate the whole CSA process in the tool. The tools translate the OECD Emission Scenario Document (ESD) and the TGD emission calculation rules into a guided, stepwise emission estimation process and corresponding pick-lists. The application of risk management measures has been additionally integrated into the tool.

## Emission Estimation Tool (EET) for textile dyeing and finishing

The EET for substances used in textile dyeing and textile finishing processes is a Microsoft Access application. The program and the explanatory manual can be ordered by email from the address indicated below. It is a demo version not yet suitable to carry out a full exposure assessment under REACH. Also, the tool currently does not fully support the needs to specify risk management measures and their efficacy in the Exposure Scenario.

The tool contains a step-wise screening on the available information related to the market volume and the intrinsic properties of the substance. Based on this, the user can decide whether an exposure assessment under REACH is required and/or whether more information on substance properties is needed.

The tool addresses the lifecycle stage "industrial use" only. It is specifically designed to assess the variety of use conditions that may occur in the textile finishing industry.

A PEC/PNEC ratio can be calculated for the water compartment and for the ambient air compartment (related to human health). If it is < 1, the assessment is finished. If the ratio is > 1 the tool offers refinement options. Fate and exposure is calculated based on the TGD rules for a local scenario.

The assessment process can also be carried out by the manufacturer of textile finishing preparations or by the finisher, given the relevant substance information has been inserted. Once a user has identified himself as a formulator or finisher, the program adjusts itself to this user. Since the program contains a data storage function, the data set for a certain substance can be completed or refined at a later stage or can be handed over to another actor in the supply chain for completion.

Each data requirement and each assessment step is explained with information boxes that can be opened while working with the tool. Hence the tool may also be suitable as a training instrument for less experienced risk assessors.

The screenshot displays the 'Screening tool supporting exposure assessment under REACH' interface. The 'Scenario' is set to 'Air Scenario' and the 'Current Stakeholder' is 'Substance Producer'. The 'Subst.: test substance' is entered. The 'Air Emission Scenario' section shows the following parameters:

Releases from process (Fsubst)	70 %
Percentage in preparation	100 %
Max. amount used (Qsubst)	50 kg/d
Abatement factor (Fabate)	80 %
Receiving air volume for dilution (Qair)	3,50E+09 m³/d

Resulting PEC<sub>local</sub>: 2,00 µg/m³  
Comparison: DNEL: 11,00 µg/m³  
Relation: PEC / DNEL: 0,18

The 'Comparison PEC/DNEL' section explains that by comparing the calculated local environmental concentration (PEC) and the derived no effect level for toxic effects (DNEL), it is determined whether further information is required or whether additional emission reduction measures need to be considered. The 'Calculated PEC value' is 2,00 µg/m³ and the 'Insert DNEL' is 11,00 µg/m³. The 'Comparison PEC/DNEL' is 0,18. The 'Result' is 'Emission to air not critical'.

Formula: 
$$PEC_{local} = \frac{Q_{subst} \times F_{subst} \times (1 - Fabate)}{Q_{air}}$$

Buttons at the bottom include 'New Selection', '<<< Previous', and 'Next >>>'.

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