How to bring your registration dossier in compliance with REACH

Tips and Hints - Part 5

Bioaccumulation II

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Bioaccumulation

- Standard information requirements
- Adaptation from the Standard information requirements
- Main Test Guidelines and their applicability

ECHA guidance on aquatic bioaccumulation

- The use of the information on bioaccumulation
  - Information on bioaccumulation is vital for understanding the environmental behaviour of a substance
  - Information on bioaccumulation is used in 1) PBT assessment, 2) hazard classification, and 3) chemical safety assessment (food chain exposure modelling)
  - Information on bioaccumulation is also a factor in deciding whether long-term ecotoxicity testing might be necessary

- Therefore bioaccumulation in aquatic species is a standard information requirement under REACH Annex IX, 9.3.2.

REACH Information Requirements (1)

Bioaccumulation

Annex IX	COLUMN 1 STANDARD INFORMATION REQUIREMENT	COLUMN 2 SPECIFIC RULES FOR ADAPTATION FROM COLUMN 1
9.3.	Fate and behaviour in the environment	
9.3.2	Bioaccumulation in aquatic species, preferably fish	The study does not need to be conducted if: • The substance has a low potential for bioaccumulation (for instance a log Kow ≤ 3) and/or a low potential to cross biological membranes, or • Direct and indirect exposure of the aquatic compartment is unlikely.

REACH Information Requirements (2)

Bioaccumulation

Annex XIII	CRITERIA FOR THE IDENTIFICATION OF PERSISTENT, BIOACCUMULATIVE AND TOXIC SUBSTANCES, AND VERY PERSISTENT AND VERY BIOACCUMULATIVE SUBSTANCES
The identification shall also take into account of the PBT/vPvB-properties of the relevant constituents of a substance and relevant transformation and/or degradation products	

Column 2 adaptation from information requirements (1)

- Low potential for bioaccumulation based on low log Kow
  - Report a reliable log Kow for the registered substance
  - In addition, report reliable log Kow's for all relevant (>0.1% w/w) **constituents**, **additives** and **impurities**
    - Log Kow is important screening information for the PBT/vPvB assessment of the constituents, additives and impurities.
    - If log Kow for any of these is > 3, the column 2 adaptation based on low log kow may not be acceptable -> potential data gap for the bioaccumulation endpoint in the registration dossier.

Column 2 adaptation from information requirements (2)

- Direct and indirect exposure of the aquatic compartment is unlikely

  - Low probability of the exposure of aquatic compartment
  - Bioaccumulation fundamental part of the assessment of hazard and fate -> adaptation on exposure ground possible **only under exeptional circumstances**:
    - For example, if it can be reliably demonstrated that there is no release to the environment at any stage in the life cycle.

Other adaptation possibilities: (Q)SAR

- Results from a (Q)SAR may be used when the conditions in Annex XI, Section 1.3 are met
  - Most bioaccumulation QSAR models apply to non-ionic, slowly metabolized substances with logKow between 1 to 6
  - The selection of a particular QSAR must be justified
  - Documentation: QMRF and QPRF have to be included in the relevant endpoint study record
  - BCF models tend to have large uncertainty
    - Potential range of predicted values should be reported
    - Cautious conclusions should be drawn using the upper range of predicted BCFs and most relevant and reliable QSAR model.

OECD 305 test guideline adopted in Oct 2012 (1)

- **OECD 305-I Aqueous Exposure Bioconcentration Fish Test**
  - Domain of the test guideline: Stable non-polar organic substances with log Kow of < 6.0
  - Flow-through test system recommended
  - Use of only one test concentration acceptable (BUT: justify that BCF is independent of test concentration)
  - Test concentration < limit of water solubility
  - BCF's based on kinetics (k_1/k_2) and measured concentations (C_f/C_w)
  - Growth-dilution correction and lipid normalisation may be necessary
  - Outcome: Definitive bioconcentration data that can be directly compared to regulatory thresholds.

OECD 305 test guideline adopted in Oct 2012 (2)

- **OECD 305-II Minimised Aqueous Exposure Fish Test**
  - Domain of the test guideline: Stable non-ionized organic chemicals with log Kow of < 6.0
  - BCF's based on kinetics (k_1/k_2)
  - Reduced number of sampling points in uptake and depuration phases
  - Growth-dilution correction and lipid normalisation may be necessary
  - Outcome: Bioconcentration data that can be used
    1. to refute or confirm BCFs estimated by Kow or QSAR and
    2. to decide if full bioconcentration test is needed.

OECD 305 test guideline adopted in Oct 2012 (3)

- **OECD 305-III Dietary Exposure Bioaccumulation Fish Test**
  - Domain of the test guideline: Non-stable poorly soluble substances with log Kow > 6
  - Accumulation to fish only via dietary route
  - Test also applicable to mixtures
  - Outcome: Biomagnification factor (BMF) based on kinetics
    - However, BMF can not be directly compared to regulatory thresholds
    - Tentative BCF's can be estimated from the BMF data using some assumptions (see Annex 8 of OECD 305 TG)

      => Recommendation: Consider the properties of your substance and use aqueous exposure test (OECD 305 I or II) if it is technically possible

Other test guidelines for bioaccumulation

- **OECD 315 Bioaccumulation in Sediment-dwelling Benthic Oligochaetes (adopted Oct 2008)**
  - Domain of the test guideline: Stable organic substances with log Kow 3.0 - 6.0 but also suitable for lipophilic (logKow > 6.0) or highly adsoptive substances or surfactants
  - Bioaccumulation via many uptake routes: direct contact, ingestion of sediment particles, sediment porewater and overlying water
  - Outcome: Bioaccumulation Factor (BAF)
    - Not directly comparable to regulatory thresholds
    - Provides valuable information about the bioaccumulation to invertebrates in sediment compartment

Links to relevant Guidance documents

- Guidance on information requirements and chemical safety assessment
  - Chapter R.7b: Endpoint specific guidance / R.7.10 Bioconcentration and bioaccumulation
    http://echa.europa.eu/documents/10162/13632/information_requirements_r7b_en.pdf
  - Chapter R.11: PBT and vPvB Assessment – draft
    http://echa.europa.eu/documents/10162/13643/inforeq_csa_r11_draft_for_peg_201305_en.pdf

- Practical Guides
  - How to report weight of evidence, data waiving, (Q)SARs…
    http://echa.europa.eu/practical-guides

Questions?

To the Q&A panel (between 11:00 and 13:30, Helsinki time), or

To the ECHA helpdesk (any time): http://echa.europa.eu/contact/helpdesk-contact-form