ECOTOXICITY ELEMENTS
TOXICITY TO TERRESTRIAL ORGANISMS

Soil invertebrates: *Lumbricus terrestris*

**PAPER REVIEWED**

Swigert J.P. 1990. Acute toxicity of linear alkylbenzene sulfonate to earthworms (*Lumbricus terrestris*). ABC Laboratory study report 38317. ABC Laboratories, Columbia, Missouri, USA.

**TEST SUBSTANCE**

- LAS (Monsanto Company).

Remarks: The neat material was 35.1 % (w/w) active LAS in an aqueous solution. No further details were given. All data expressed in mg LAS (active substance) / kg d.w. soil (nominal values).

**METHOD**

- Laboratory: Analytical Bio-Chemistry Laboratories Inc. Aquatic Toxicology Division. 7200 East ABC Lane, Columbia, Missouri, USA.
- Objectives: To determine the toxicity of LAS towards the earthworm *Lumbricus terrestris* on the basis of mortality, growth and cocoon production after 7 to 14 days exposure.
- Test substrate/application: Artificial soil as described by OECD (1984).
- Spiking method: Appropriate weights of the LAS solution (35.1 % LAS in water) were mixed with 1.16 L of deionized water and added to 2.44 kg of artificial soil, resulting in 5 LAS spiked soils (5 concentrations) with a water content of 35%.
- GLP: Yes.
- Year (study performed): 1989.
- Species/strain/supplier: Earthworms were obtained from Carolina Biological Supply Company, Burlington, North Carolina, USA.
• Analytical monitoring  Nominal concentrations in the test (day 0, 7 and 14) were measured by Monsanto Company.

• Exposure period  14 days.

• Endpoints  Mortality, burrowing time, fresh weight, growth, general health (not quantitative), behaviour (not quantitative) and cocoon production (not quantitative).

• Statistical methods  Anova analysis, followed by linear contrasts was performed for the weight data.

Remarks: Weight and growth were assessed as mean weight / growth per replicate (mean of 10 worms).

RESULTS

• Nominal concentrations  0, 84, 167, 333, 667, 1333 mg LAS / kg d.w.

• Measured concentrations  Although more analyses were performed, only the data from the 667 mg LAS / kg d.w. were presented in the reviewed paper.

• NOEC, LOEC, ECx, LCx.  The NOECweight (7 and 14 days) was 667 mg LAS / kg d.w., the LOECweight (7 and 14 days) was 1333 mg LAS / kg d.w. The data were not sufficient to calculate an LC10 or LC50: only 22.5 % mortality occurred after 14 days. ECx values were not given in the reviewed manuscript. We calculated ECx values for weight, growth and burrowing based on Vanewijk and Hoekstra (1993, Table 1).

Remarks: /

CONCLUSIONS

The lowest EC10 value was found for growth (7 days), 636 mg LAS / kg d.w. (Table 1).

RELIABILITY

Klimisch score  1c (test procedures according to national standards): performed under GLP according to guideline (US FDA 1987), but only limited measured concentrations available; tested compound not fully described.
REFERENCES

OECD 1984. OECD guideline for testing chemicals nr. 207. Earthworm, acute toxicity tests.
Environmental Assessment Technical Guide no. 4.12.

ECx calculations performed by the reviewers

Table 1 represents the results of our ECx calculations based on the raw data of the experiments.

Table 1: Calculated ECx values and confidence intervals (mg LAS / kg d.w.) (mg LAS / kg d.w.) performed according to Vanewijk and Hoekstra (1993) for *Lumbricus terrestris*, exposed to LAS.

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Exposure time</th>
<th>EC10</th>
<th>EC50</th>
<th>Hormesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>7 days</td>
<td>846</td>
<td>3136</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(290-2465)</td>
<td>(518-18960)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 days</td>
<td>668</td>
<td>1157</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(244-1828)</td>
<td>(765-1751)</td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>7 days</td>
<td>636</td>
<td>1160</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(242-1675)</td>
<td>(815-1652)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 days</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>Burrowing</td>
<td>7 days</td>
<td>1242&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1319&lt;sup&gt;a&lt;/sup&gt;</td>
<td>No</td>
</tr>
</tbody>
</table>

N.A. = data insufficient for ECx calculations.
<sup>a</sup> = data insufficient to calculate confidence intervals.