

## LIST OF SELECTED PUBLICATIONS:

Sihtmäe M. *et al.* (2013). **Ecotoxicological Effects of Different Glyphosate Formulations.** *Applied Soil Ecology*, 72, 215–24

Kahru A. and Põllumaa L. (2006.) **Environmental Hazard of the Waste Streams of Estonian Oil Shale Industry: an Ecotoxicological Review.** *Oil Shale*, 23, 53-93

Aruoja V. *et al.* (2015). **Toxicity of 12 Metal-Based Nanoparticles to Algae, Bacteria and Protozoa.** *Environmental Science: Nano*, 2, 630–44

Blinova I. *et al.* (2018) **Assessment of the Hazard of Nine (Doped) Lanthanides-Based Ceramic Oxides to Four Aquatic Species.** *Science of the Total Environment*, 612, 1171–76

Heinlaan M. *et al.* (2008) **Toxicity of Nanosized and Bulk ZnO, CuO and TiO<sub>2</sub> to Bacteria *Vibrio fischeri* and Crustaceans *Daphnia magna* and *Thamnocephalus platyurus*.** *Chemosphere*, 71, 1308-16

Kubo A.-L. *et al.* (2018). **Antimicrobial Potency of Differently Coated 10 and 50 nm Silver Nanoparticles Against Clinically Relevant Bacteria *Escherichia coli* and *Staphylococcus aureus*.** *Colloids and Surfaces B: Biointerfaces*, 170, 401–410

Rosenberg M. *et al.* (2018) **Rapid in Situ Assessment of Cu-Ion Mediated Effects and Antibacterial Efficacy of Copper Surfaces.** *Scientific Reports*, 8, 1-12

Suppi S., Kasemets K. *et al.* (2015) **A novel Method for Comparison of Biocidal Properties of Nanomaterials to Bacteria, Yeasts and Algae.** *Journal of Hazardous Materials*, 286, 75-84

Ivask A. *et al.* (2015) **Toxicity of 11 Metal Oxide Nanoparticles to Three Mammalian Cell Types In Vitro.** *Current Topics in Medicinal Chemistry*, 15, 1914–29

Laboratory of Environmental Toxicology holds the **key competence** in Estonia for evaluating the **(eco) toxicity** of chemicals and environmental samples (such as wastewaters, solid wastes, contaminated soils and sediments).



Laboratory of Environmental Toxicology provides (eco)toxicity screening of samples using several **biotests** and test organisms (crustaceans, ciliates, algae, bacteria, etc).



Most of the biotests are conducted in compliance with the **OECD and/or ISO** standards but not accredited. The GLP (good laboratory practice) principles are followed.



Scientific excellence: in 2018 three of the laboratory members belonged to the list of 1% highly cited researchers (A. Kahru, A. Ivask ja K. Kasemets) (Clarivate Analytics, 2018).



Additional information via web link

## LABORATORY OF ENVIRONMENTAL TOXICOLOGY



## Services for chemical and environmental safety

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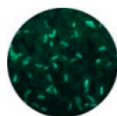
[www.facebook.com/pg/KBFI.KTL](https://www.facebook.com/pg/KBFI.KTL)

## ECOTOXICITY TESTING OF CHEMICALS AND ENVIRONMENTAL SAMPLES

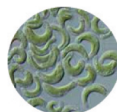
### Service target groups:

- Chemical industry
- Enterprises with industrial activities that pose a risk of environmental contamination
- Assessors of polluted water, sediments and soils

- **30-min bioluminescence inhibition test with marine bacterium *Vibrio fischeri*** (ISO 11348-3:2007 and ISO 21338:2010).



- **72-hour growth inhibition test with freshwater microalgae *Raphidocelis subcapitata*** (OECD 201).



- **Tests with freshwater crustacean *Daphnia magna*:**

- **48-hour acute toxicity test** (OECD 202)
- **21-day chronic toxicity test** (OECD 211).

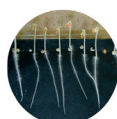


Toxicity is measured by immobilisation (acute assay) or reproduction (chronic assay).

- **7-day *Lemna minor* (common duckweed) growth inhibition test** (OECD 221).



- **3-day terrestrial plant test for seedling emergence and early growth with higher plants *Sorghum saccharatum*, *Lepidium sativum* and *Sinapis alba*** (OECD 208).



## ANTIMICROBIAL EFFICIENCY AND SAFETY EVALUATION OF CHEMICALS

### Service target groups:

- Manufacturers and research and development partners of antimicrobials
- Chemical and material industry

- **Antimicrobial efficiency testing of chemicals by the growth inhibition of microbes in suspension assays** (ISO 20776-1, EURL ECVAM DB-ALM Protocol No 33).

**Test organisms:** *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Bacillus subtilis* and *Candida albicans*.

- **Measurement of antimicrobial activity of surfaces** (ISO 27447 and ISO 22196).

**Test organisms:** *Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans*.

- **Bacterial reverse mutation assay for the mutagenicity testing of chemicals** (OECD 471).

**Test strains:** *Salmonella typhimurium* TA98 and TA100.

- **Toxicity testing of chemicals with mammalian cell lines *in vitro*.**

**Cell lines:** human alveolar cell line A549, human epithelial cell line Caco-2, human monocytic cell line THP-1, mouse fibroblast Balb/c3T3 cell line and human keratinocyte cell line HaCaT.

The toxic effect of chemicals is evaluated by the reduction of cellular viability using different vital dyes, e.g. MTT, Alamar Blue and neutral red.

## PHYSICO-CHEMICAL CHARACTERISATION OF NANOMATERIALS

### Service target groups:

- Manufacturers of nanomaterials
- Research and development partners
- Investigators of nanomaterials

- **Hydrodynamic size and surface charge measurements of nanoparticle suspensions.**

**Method:** dynamic light scattering (DLS) and electrophoretic light scattering (ELS) techniques. Malvern Zetasizer instrument is used.



## QUANTIFICATION OF METALS

### Service target groups:

- Research and development partners
- Assessors of polluted water, sediments and soils

- **Elemental analysis of metals in samples.**

**Method:** total X-ray fluorescence spectroscopy (TXRF). Picofox S2 (Bruker) instrument is used.

Measurements by TXRF technique for quantitative and semi-quantitative microanalysis of multi-element trace substances in solutions.

