

# **Environmental grouping and read-across for nanomaterials – are the properties defined by ECHA sufficient regarding green algae?**

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## **Introduction**

Engineered nanomaterials show great variation. According to the European Chemicals Agency (ECHA), grouping and read-across approaches can be applied to reduce the number of tests required for the risk assessment. In the grouping and read-across concept, a nanoform has the same crystalline structure, comparable particle size distribution, morphology, surface functionalization and surface area. In the document it is not specified whether these criteria apply to both, humans and environmental organisms and compartments. We performed systematic experimental studies with several nanoforms and a literature review addressing environmental standard test organisms such as algae.

## **Results**

Nanomaterials affect aquatic organisms differently and relevant physico-chemical parameters have to be defined specifically for every group of test organisms. Potential different mode of actions need consideration, and whether they can be observed at the test conditions.

For green algae, there are indications that the attachment efficiency of nanomaterials to the organisms is an important factor for metals, metal oxides and CNTs. In case of attachment, parameters expressed on the surface of the nanomaterials such as reactivity, are mainly relevant. If there is no obvious tendency for attachment, nanomaterial properties affecting the algae via the test medium such as solubility are important. Expansion of the criteria to advanced materials such as polyurethane with larger dimensions are under development.

## **Conclusions**

Attachment behaviour and reactivity cover several of the properties defined by ECHA and can be directly linked to ecotoxicity. Qualitative methods describing the attachment behaviour are available. Quantitative approaches have to be developed.

## **Summary**

The criteria defined by ECHA in their grouping and read-across concept can affect ecotoxicity inversely. To reduce the number of tests required for the risk assessment the sum parameters “attachment behaviour” and “reactivity” are considered to be suitable indicators for read-across and grouping regarding ecotoxicity on algae.