**Company**
Shell

**Case Title**
Improving biodegradation assessment of chemicals for a greener future - Towards improved ready biodegradability tests

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**Problem description**
Royal Dutch Shell is an English-Dutch oil and gas company. It is one of the biggest companies in the world with its branches in more than 70 countries. One of the activities of the company is to develop new chemicals for a wide range of products used in our daily lives. The new chemicals produced by Shell need to undergo stringent regulatory checks before they can be put on the market. Accumulation and persistence of chemicals is a major factor to be assessed.

In order to address this, Shell performs biodegradation assessments to ensure the environmental degradation of the chemicals. Particularly, the conversion of a new chemical into harmless substance(s) by microbial inocula is determined with a simple and cost-effective test called the Ready Biodegradation Test (RBT). In this test, chemical(s) are incubated with environmental microbes and evaluated for their degradation or persistence with the aid of different chemical or biochemical techniques.

**Approach**
There are several problems associated with the current RBT required by regulators. These issues primarily include the inconsistency and reliability of the test results. In this workshop we developed strategies that can be appended to the existing RBT protocol to overcome the inconsistencies and improve the reliability of test results. We also propose additional steps to understand the reasons behind the failure of an RBT.

**Promising solution(s)**
The proposed solutions include the standardization of the inoculum sampling, handling and characterization (qualitative and quantitative) with the help of relatively simple biochemical and
molecular biology techniques. We also included a controlled workflow strategy and correlation models that can be used to perform quality checks and increase the reliability and provide a better understanding of test results.

**Conclusion**

With the implementation of the aforementioned steps, we expect to decrease the variability in the results of the existing RBT protocols. In addition, this will strengthen the reliability of current test protocols and assist Shell with biodegradation assessments of new chemicals. Overall, our strategy will ensure a better assessment of persistence of chemicals.

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