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Monitoring the leaching of micro- and nanoplastic from bottles into pure water

“The OFzi® method enables an in-depth and seamless observation of smallest amounts of plastic particles leaching into very large samples of water.”

Monitoring the leaching of micro- and nanoplastic particles from bottles into ultrapure water

Continuously measuring plastic particle contamination and the leaching processes of different polypropylene bottles and comparing them to glass bottles.

Challenge

Katharina Heider (a researcher at a leading Austrian university) was unable to obtain insights into leaching from polypropylene bottles until she performed OFzi® measurements.

Previously there was no technology available to measure concentrations down to a few particles per milliliter.

Experiment

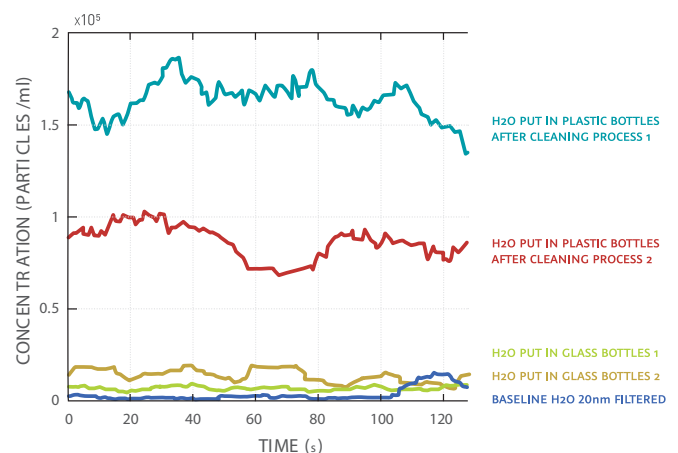
In the experiment, Katharina sterilized the bottles according to the manufacturer’s recommendations and performed various cleaning procedures using 20-nm-microfiltrated ultrapure water. No further sample preparation was required.

- After taking the baseline concentration Katharina measured the particle concentration in glass and plastic bottles and repeated the cleaning and measuring procedure three times.
- They discovered that different contaminations are seen for different cleaning procedures.
- For the experiment, a relatively large sample had to be pumped through the analyzer over a long period of time, in this case 50 minutes.

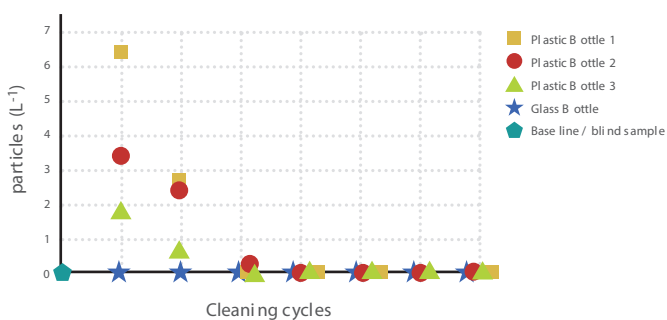
One of the takeaways from the experiments is that particles are leaching into the liquid as soon as the liquid is in the plastic bottle.

The challenges were:

- No possibility for live or time-resolved measurements to monitor particle concentrations.
- The particle concentrations are very low and therefore a very large sample is required.
- The results of such low concentrations are not statistically relevant and almost impossible to measure with other methods.



Time-resolved particle concentrations measured in plastic and glass bottles with baseline © BRAVE Analytics



Particles detected in plastic and glass bottles after cleaning cycles with baseline (left); steps of the experiment (right) © BRAVE Analytics and Katharina Heider

