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Micro- and nanoplastics in drinking water - survey in Sweden

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Assignment

The Swedish Food Agency (SFA; Livsmedelsverket) has received the following assignment from the government

- The NFA shall compile knowledge of health risks with microparticles and nanomaterials of plastics and especially by consumption of drinking water,
- mapping the presence of such contaminants in drinking water in Sweden as well as,
- at needs, propose measures to reduce the exposure

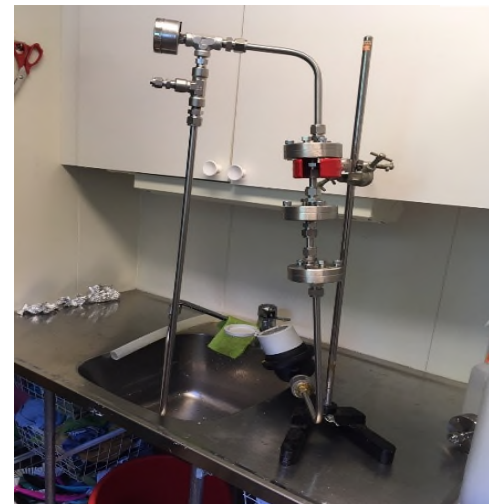
The assignment shall be reported no later than 15 December 2019.

Challenges

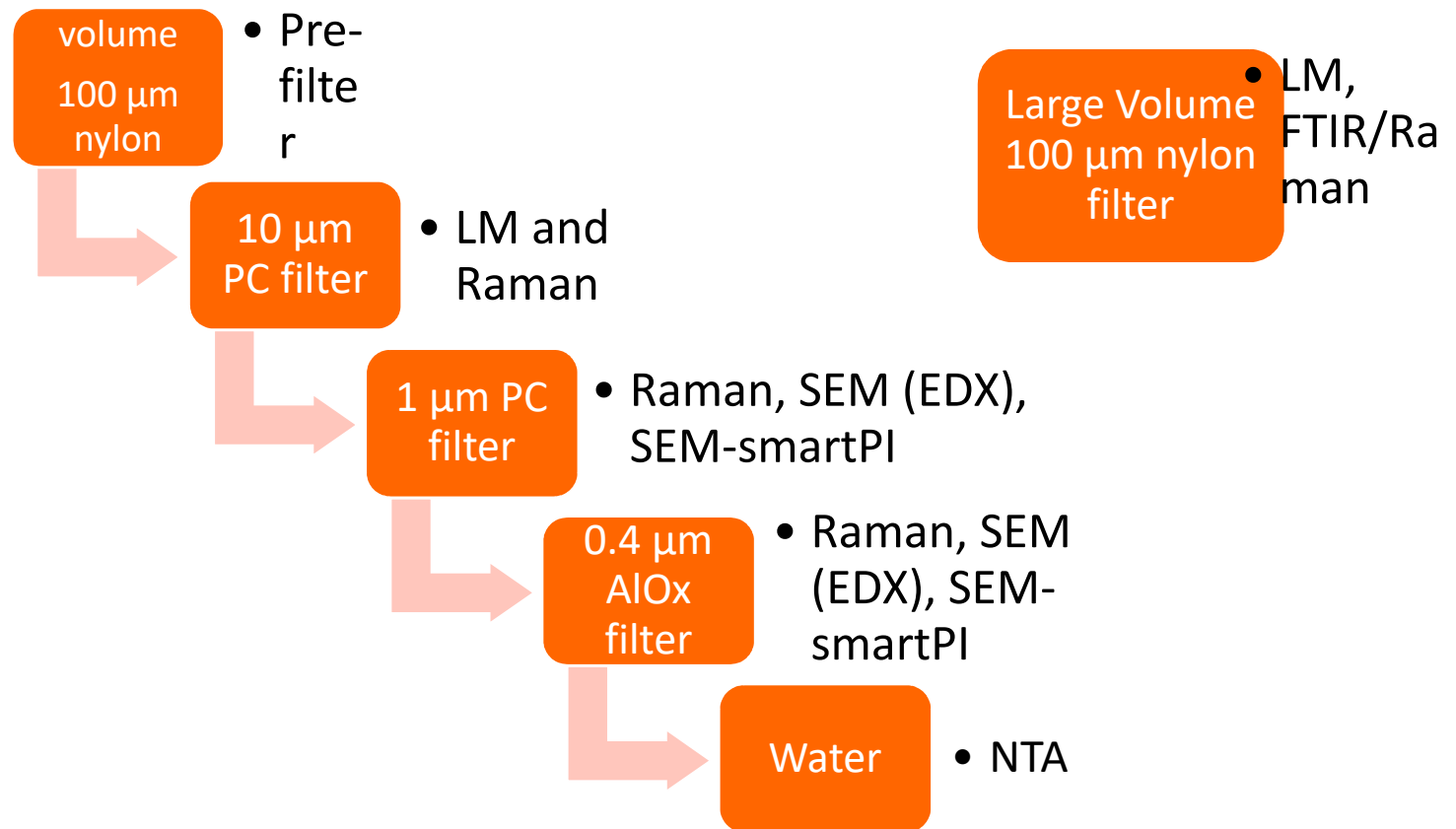
- No standardized sampling or analytical methods
- Time-consuming analytical methods (sequential filtration, visual characterization/quantification, identification (μ Raman, μ FTIR))
- No analytical method for nanoplastics

Sampling

- 10 sampling places in Sweden; twice sampled
- Large river lakes, historical presence of other pollutants (both ground- and surface water sources)
- Tap water on 2 different occasions (summer, winter)
- University of Gothenburg
- Suitable sampling device
- Lower limit 0.4 μm



Sampling method



Analytical method

- 100 μm filter is analyzed by LM and Fourier-Transformed infrared spectroscopy (FT-IR) imaging
- 10 μm filter is analyzed by LM and μ -Raman spectroscopy
- 1 and 0.4 μm filters are analyzed by scanning electron microscopy (SEM) with energy-dispersive X-ray spectroscopy (EDX)
- Water that passes through 0.4 μm filter is analyzed by nanoparticle tracking analysis (NTA)

Sampling and analytical challenges

- The pressure from the taps varied between sampling places and during sampling
- Air bubbles led to smaller sample volume in some places
- 100 μm ; a lot of sedimentation, bio-film, iron oxide
- 10 μm ; organic matter in the smaller filters clogging
- Not an even distribution of the particles on the filters
- Purification of the filters, several steps, time-consuming

Conclusion?

Survey of microplastics and nanoplastics in drinking water will be finalized this autumn

However, increasing challenges when analyzed at lower filter pore sizes lead to:

- reduction of sampling places
- and less results from lower filter pore sizes?

A compilation of knowledge of health risks with microparticles and nanomaterials of plastics by the oral route are almost finalized

Report to the government in December 2019