Micro and nano plastics in drinking water

Government assignment

Marie-Louise Nilsson

Department of Risk and Benefit Assessment
Swedish Food Agency
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Regulation letter 2018

- Conduct a review on health risks associated with micro and nano plastics in drinking water
- Assess the occurrence in drinking water in Sweden
- If regarded necessary, suggest risk management action in order to reduce the exposure

Definition of micro and nano plastics

- Micro plastics: 100 nm to 5 mm
- Nano plastics: 1 - 100 nm

- In this work ”micro plastics” and ”nano plastics” refers to solid particles independent of their shape (e.g., plastic granules, pellets, flakes, and fibres). Rubber not included.

Review on health risks (2018-2019)

- Limited knowledge on human health risks
- Animal studies relevant for risk assessment missing
- Aquatic organisms studied, and various effects documented

- Discussed that particles may interact with immune system, e.g., give rise to inflammations, but this has not been confirmed

- Today's knowledge not adequate for "traditional risk assessment" including how much micro and nano plastics is acceptable

Occurrence in drinking water (2019)

- Focus on drinking water - sampling at tap
- Regarded most relevant since the number of samples limited by available resources (including capacity for sampling and analysis)
- Focus on micro particles since standardized analytical methods were not available for nano plastics

Occurrence in drinking water (2019)

- 10 locations across Sweden initially selected based on
  - Geographical variation
  - Type of water source and purification techniques in distributing waterworks
  - Size of distributing waterworks

- Problems with occurrence of organic material on filters
  - Development and assessment of new cleaning methods (washing of filters), and production of modified filters and filter holders
  - This significantly affected the time line in the project

Occurrence in drinking water (2019)

- Micro plastics in 4 size intervals
- Higher concentration of smaller particles
- No. of other particles (not plastics) may be significantly larger

1 - 10 micro meter

- Luleå: No plastic particles identified
- Stockholm: 1 of 3000 particles was plastics
- Malmö: 6 of 1105 particles was plastics

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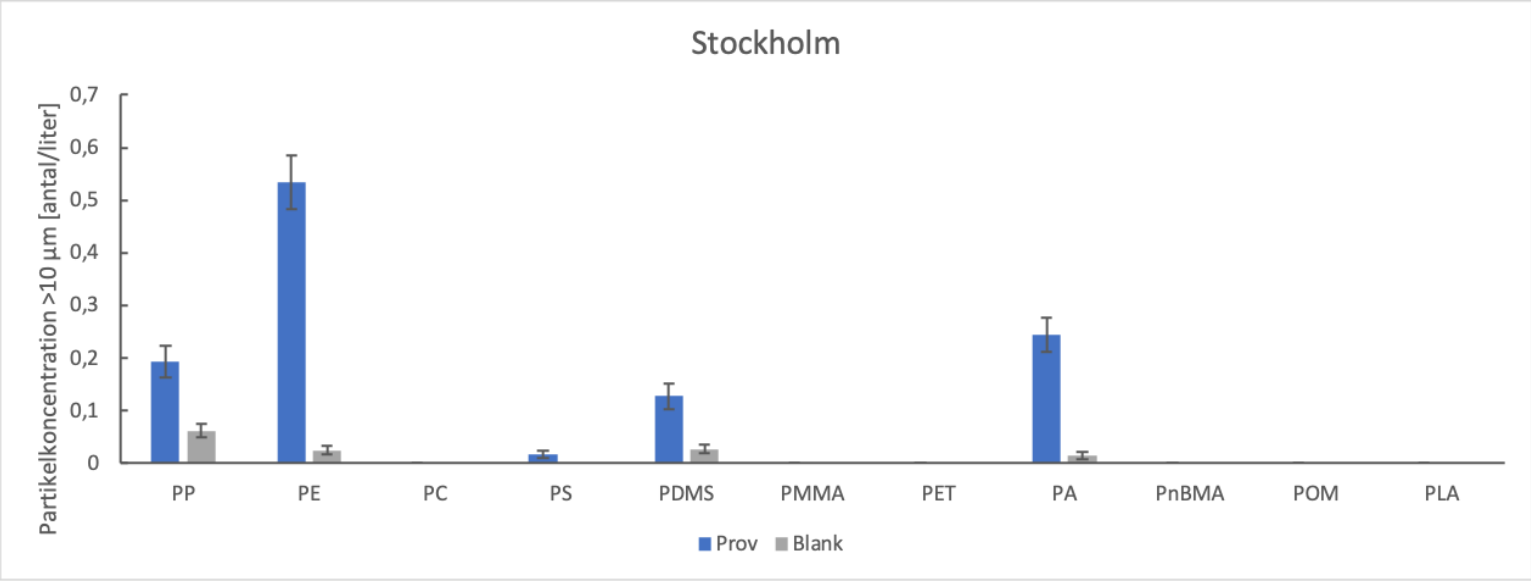
City	Size (micro meter)	Particles per litre
Göteborg surface water	> 100	0,03
	30-100	0,3
	10-30	0,4
	1-10	24 000
Luleå ground water	> 100	0,06
	30-100	0,2
	10-30	0,9
	1-10	*
Lund surface water	> 100	0,01
	30-100	0,3
	10-30	1,4
	1-10	128
Malmö surface and ground water	> 100	0,06
	30-100	0,6
	10-30	12
	1-10	129
Stockholm surface water	> 100	0,05
	30-100	0,4
	10-30	0,6
	1-10	*
Uppsala ground water	> 100	0,07
	30-100	0,2
	10-30	1,3
	1-10	20 000

Occurrence in drinking water (2019)

- Dominating types were polyethylene (PE) and polyamide (PA), followed by silicone (PDMS), polypropylene (PP) and polystyrene (PS)
- PE, PP and PS: largest production volumes of plastics, and are often found in the environment



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Health risk assessment - conclusion

- Human health risk not identified based on large review
- Based on our analysis drinking water not singled out as a particularly important source - exposure from e.g., bottled water and air may even be larger
- Micro plastics as carrier of chemical substance indicate low risks for considered examples
- WHO (2019): “Based on the limited evidence available, chemicals and microbial pathogens associated with microplastics in drinking-water pose a low concern for human health.”

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Overall conclusion

- Based on today's knowledge in combination with the drinking water survey in Sweden, human health risk as a result of exposure to nano or micro plastics in drinking water could not be identified or clearly indicated

- A basis for risk management actions was therefore not found

- Improvements in the assessment requires broader knowledge of occurrence and exposure as well as toxicological studies relevant for risk assessment

Thank you!

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