

Example test results - Microplastics in blood

Methods

Testing was performed by an ISO/IEC 17025 accredited external service provider.

Additional information

The analysis included quantification & characterization of microplastics in the size range between 10 and 500 µm with FTIR.

Sample preparation:

1 mL of blood was collected and transferred to a 50 mL scintillation bottle (rinsed with ultrapure water). 15 mL of Tris-HCl buffer (400 mM, Tris-HCl, pH 8, 0.5% SDS, Trizbase T6791, HCl F1758, Sigma, Schnelldorf, Germany) was added to the bottle, which was then heated in a water bath for 1 hour at 60 °C (protein denaturation). 100 µL of 1 mg/mL proteinase K was added to digest proteins + 1 mL of 5 mM CaCl₂ to prevent proteinase K autolysis. The mixture was left to incubate for 2 hours at 60 °C and was then vortexed for 30 seconds. 10 mL of 30% H₂O₂ was added, followed by 48 hours of digestion, then incubation for 20 min at 60 °C (water bath). Filtration was performed using the Tulip system (10 µm stainless steel mesh); observation & quantification by microscopy (Spotlight FTIR).

Sample preparation was based on the protocol detailed in the following journal article:
Leslie, H. A., Van Velzen, M. J., Brandsma, S. H., Vethaak, A. D., Garcia-Vallejo, J. J., & Lamoree, M. H. (2022). Discovery and quantification of plastic particle pollution in human blood. *Environment International*, 163, 107199.

Used sample volumes: 1 mL

Ultrapure water: 1 MP/mL

Blank: 2 MP/mL

Results

Results are displayed in Tables 1-4 on the following pages.

Table 1: Results of BLANK and samples 1 - 4

Particles type	Class of sizes	Unit	Results				
			BLANK	1	2	3	4
Polyethylene	20-50 µm	Number of particles					3
	50-100 µm	Number of particles				2	3
	100-500 µm	Number of particles	3		2		
	> 500 µm	Number of particles					
Polypropylene	20-50 µm	Number of particles		2	2		1
	50-100 µm	Number of particles		4		7	4
	100-500 µm	Number of particles			5	1	
	> 500 µm	Number of particles					
PVC	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyamide	20-50 µm	Number of particles					3
	50-100 µm	Number of particles		4			
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polystyrene	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyethylene terephthalate	20-50 µm	Number of particles					
	50-100 µm	Number of particles	2	3			
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Ethylene vinyl acetate	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles				4	
	> 500 µm	Number of particles					

PVA poly(vinyl alcohol)	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Biopolymers	20-50 µm	Number of particles		5			
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyoxyméthylène	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Others polymers	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Final concentrations (MPs/mL)		Number of particles	5	18	9	14	14

Table 2: Results of samples 5 - 9

Particles type	Class of sizes	Unit	Results				
			5	6	7	8	9
Polyethylene	20-50 µm	Number of particles		4	2	15	
	50-100 µm	Number of particles		8		2	
	100-500 µm	Number of particles					3
	> 500 µm	Number of particles					
Polypropylene	20-50 µm	Number of particles		1	3		
	50-100 µm	Number of particles					
	100-500 µm	Number of particles		2	7		
	> 500 µm	Number of particles					
PVC	20-50 µm	Number of particles	5	5			1
	50-100 µm	Number of particles	3				4
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyamide	20-50 µm	Number of particles			1		
	50-100 µm	Number of particles					
	100-500 µm	Number of particles		7			
	> 500 µm	Number of particles					
Polystyrene	20-50 µm	Number of particles					
	50-100 µm	Number of particles					2
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyethylene terephthalate	20-50 µm	Number of particles					
	50-100 µm	Number of particles		5			
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Ethylene vinyl acetate	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles		4			
	> 500 µm	Number of particles					

PVA poly(vinyl alcohol)	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Biopolymers	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyoxyméthylène	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Others polymers	20-50 µm	Number of particles					1
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Final concentrations (MPs/mL)			8	36	13	17	11

Table 3: Results of samples 10 - 14

Particles type	Class of sizes	Unit	Results				
			10	11	12	13	14
Polyethylene	20-50 µm	Number of particles	4	3	2	2	4
	50-100 µm	Number of particles	4	1	2	5	4
	100-500 µm	Number of particles	2	3			4
	> 500 µm	Number of particles					
Polypropylene	20-50 µm	Number of particles		1	4	3	6
	50-100 µm	Number of particles		3		5	2
	100-500 µm	Number of particles	2				5
	> 500 µm	Number of particles					
PVC	20-50 µm	Number of particles					
	50-100 µm	Number of particles			4		
	100-500 µm	Number of particles					1
	> 500 µm	Number of particles					
Polyamide	20-50 µm	Number of particles			3	1	
	50-100 µm	Number of particles	4				
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polystyrene	20-50 µm	Number of particles					
	50-100 µm	Number of particles			3		
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyethylene terephthalate	20-50 µm	Number of particles					
	50-100 µm	Number of particles		4			
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Ethylene vinyl acetate	20-50 µm	Number of particles				5	
	50-100 µm	Number of particles			4		
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					

PVA poly(vinyl alcohol)	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Biopolymers	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Polyoxyméthylène	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Others polymers	20-50 µm	Number of particles					
	50-100 µm	Number of particles					
	100-500 µm	Number of particles					
	> 500 µm	Number of particles					
Final concentrations (MPs/mL)			16	15	22	21	26

Table 4: Results of samples 15 - 20

Particles type	Class of sizes	Unit	Results					
			15	16	17	18	19	20
Polyethylene	20-50 µm	Number of particles	3	5	3	3	5	2
	50-100 µm	Number of particles	2	2		1	4	
	100-500 µm	Number of particles			4	14		
	> 500 µm	Number of particles						
Polypropylene	20-50 µm	Number of particles	3	4	4	5	2	6
	50-100 µm	Number of particles						2
	100-500 µm	Number of particles						
	> 500 µm	Number of particles						
PVC	20-50 µm	Number of particles	5		3		5	
	50-100 µm	Number of particles			1	15		
	100-500 µm	Number of particles				5	5	4
	> 500 µm	Number of particles						
Polyamide	20-50 µm	Number of particles					5	
	50-100 µm	Number of particles					3	
	100-500 µm	Number of particles					2	
	> 500 µm	Number of particles						
Polystyrene	20-50 µm	Number of particles						5
	50-100 µm	Number of particles						
	100-500 µm	Number of particles						
	> 500 µm	Number of particles						
Polyethylene terephthalate	20-50 µm	Number of particles		2				
	50-100 µm	Number of particles	1			4		
	100-500 µm	Number of particles						
	> 500 µm	Number of particles						
Ethylene vinyl acetate	20-50 µm	Number of particles						
	50-100 µm	Number of particles						
	100-500 µm	Number of particles				5	6	
	> 500 µm	Number of particles						

PVA poly(vinyl alcohol)	20-50 µm	Number of particles						
	50-100 µm	Number of particles						
	100-500 µm	Number of particles						
	> 500 µm	Number of particles						
Biopolymers	20-50 µm	Number of particles						
	50-100 µm	Number of particles						
	100-500 µm	Number of particles						
	> 500 µm	Number of particles						
Polyoxyméthylène	20-50 µm	Number of particles						
	50-100 µm	Number of particles						
	100-500 µm	Number of particles						
	> 500 µm	Number of particles						
Others polymers	20-50 µm	Number of particles						
	50-100 µm	Number of particles						
	100-500 µm	Number of particles						
	> 500 µm	Number of particles						
Final concentrations (MPs/mL)			14	13	15	52	37	19

End of the test report