Media Factsheet

Resolving the Global and Environmental Issue of Microplastics at Agilent

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The topic of microplastic pollution has become a high-priority area of study in recent years due to the increasing prevalence of plastic in our environment, and the limited knowledge we have on its impact to human health.

A critical step to addressing the global issue of plastic particle pollution is the advancement of research relating to the characterization of microplastic particles. By partnering with labs, universities and research facilities, private companies and public institutions, Agilent provides the necessary workflow solutions needed to further research and understanding on this pertinent environmental challenge.

Why is Agilent prioritizing the study of microplastics?

The scale

Plastics are continuing to enter our environment at an alarming rate, with approximately 400 million metric tons of plastic produced annually.[5] Microplastics are a direct result of plastic production, and they have become pervasive in our environment, with their presence confirmed in the food and water we consume as well as in the air we breathe.

The issue

Research has indicated that microplastic consumption can be detrimental to animal health, leading to the obstruction of their digestive systems, and the absorption of hazardous environmental contaminants. The full implications of microplastic pollution to human health are currently unknown, but we do know that microplastic particles of sizes ranging from 50 to 500 µm can pass through the body.[6] Further research needs to be conducted into whether the absorption of hazardous chemicals within these plastic particles can lead to future health defects as a result of biotoxicity accumulation.

The next step

While scientists are working quickly to learn more about how microplastics may affect the human body, the lack of standard methods for microplastics testing means that comparisons across studies can be problematic. By standardizing microplastic testing methods globally, we will be in a better position to provide accurate data that can be used to inform policy at a global level and fill unmet research gaps.

What are microplastics?

- Microplastics are miniscule pieces of plastic, which measure between 1 µm to 5 mm in size,[1] approximately the size of a sesame seed.[2]
- Microplastics can be placed into two categories: **primary microplastics**, which are very small plastic pieces that have deliberately been manufactured into products (e.g., shower gel, toothpaste) and **secondary microplastics**, which are small plastics that originate from larger plastics that have since degraded (e.g., paints, abraded tires from driving, textiles).[3]
- Current research suggests that microplastics will also degrade into smaller particles on a nanoscale, called **'nanoplastics'**, which measure in the range of 1 to 1000 nm.[4]

1. Frias, J. P. G. L.; Nash, R. Mar. Pollut. Bull. 2019, 138, 145–147. **2.** National Ocean Service. What Are Microplastics? Available at: https://oceanservice.noaa.gov/facts/microplastics.html. Accessed: May 2020. **3.** GESAMP. Sources, Fate and Effects of Microplastics in the Marine Environment. Available at: http://www.gesamp.org/publications/reports-and-studies-no-90. Accessed: May 2020.
4. Gigault, J et al. Environ. Pollut 2018, 235, 1030–1034. **5.** Geyer R et al. Science Advances. 2017, 3(7).
6. https://www.theguardian.com/environment/2018/oct/22/microplastics-found-in-human-stools-for-the-first-time.

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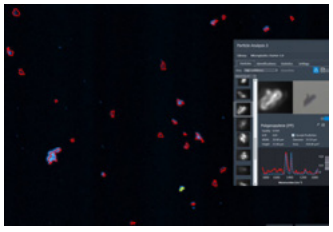
Addressing the gaps in microplastics research

The World Health Organization (WHO) has issued a report calling for further research into the impact of microplastics and nanoplastics – it states that **"a number of research gaps need to be filled"** to assess the true risk of these plastics on our health, as our current data is lacking.[7]

Agilent is committed to answering this call to action by partnering with organizations and researchers to enable accurate characterization and quantification of microplastics in terms of their chemical identity, size, shape, and total mass. Enabling such research assists in addressing the gaps in knowledge that must be filled in order to tackle the global issue of microplastic pollution, and it will help to inform the development of global standards and regulations for plastic use and pollution.

Agilent's microplastics testing solutions enabling 'accuracy, efficiency and productivity'

Agilent is a leader in advancing the study of microplastics across the world, offering a range of instruments, both benchtop and portable handheld to analyze microplastics onsite in laboratories and outdoors in remote environments, ensuring for immediate and real-time results.



Agilent 8700 LDIR Chemical Imaging System

(Microplastics analysis pictured with the Agilent 8700 LDIR)

The Agilent 8700 Laser Direct Infrared (LDIR) chemical imaging system provides complete and quick characterization for microplastic particles as small as 10µm.

Based on a Quantum Cascade Laser (QCL) light source, the fully automated workflow allows the user to analyze more samples, in greater detail, in minutes vs. hours. This robust solution provides the user with more statistical data than ever when analyzing microplastics in the environment or the food chain.

With more meaningful information available, the user can make more informed, faster decisions in product development reducing both costs and analysis time.

Agilent GC/MS systems

(pictured 8890 GC System coupled to a 5977B MS)

Agilent's market-leading GC/MS analyze different types and concentrations of microplastics in samples. GC/MS methods provide complementary analytical information for microplastic detection along with IR technology.

Agilent Smart Gas Chromatography (GC) systems provide proven reliability, high sample throughput, and Instrument Intelligence. They deliver high analytical performance with instrument intelligence predictive technologies to avoid problems before performance is affected.

Agilent's range of benchtop, online, and portable GC systems provide laboratories with increased analytical performance, reduced cost of ownership, and decreased capital expenditure investing.

These systems can be seamlessly combined with sample introduction techniques like pyrolysis and thermal desorption to analyze microplastics.

7. World Health Organization. Microplastics in Drinking-Water. Available at: https://apps.who.int/iris/bitstream/handle/10665/326499/9789241516198-eng.pdf?ua=1. Accessed: May 2020.

Agilent FTIR benchtop systems

(pictured Cary 630 FTIR Spectrometer)

The Agilent Cary 630 FTIR spectrometer is a flexible benchtop FTIR spectrometer that offers high-performance and extraordinary ease of use for cutting-edge research and routine analysis alike. When equipped with the ATR accessory, it enables fast identification of larger microparticles in the size range from around 300µm up to 5mm.

The Cary 630 FTIR has entered the laboratory with the reputation of being an extremely robust, reliable and flexible benchtop FTIR spectrometer that offers outstanding performance and reproducibility, even in humid and tropical environments. At just 20 x 20 cm and 3.6 kg, it is the world's smallest and lightest benchtop FTIR spectrometer and can be easily repositioned to produce high quality results wherever needed. Native workflows with picture-guidance and color-coded reporting in the MicroLab software make finding answers with the Cary 630 impressively simple.

FTIR Compact & Portable Imaging Systems

(pictured 4500 Series Portable FTIR)

The Agilent 4500 Portable FTIR Spectrometer is rugged, light (just 6.8kg or 15lbs) and designed specifically for out-of-lab, field-based measurements. Incorporating a rechargeable battery and operated by tablet or laptop it is ready to use right where you need it. Like the Cary 630, it enables routine analysis of larger microparticles and plastic debris; on the beach, on a boat, down a valley or up a mountain, quite literally anywhere you take it.

Agilent Supplies and Consumables for Successful Microplastics Analysis

Sample Vials and Caps

When it comes to selecting the perfect container for your precious samples, Agilent offers a range of materials inclusive of borosilicate glass limiting metal leeching and a wide selection of polymers limiting extractables.

Analytical Columns for GC

J&W GC columns deliver industry-leading technology with the highest inertness, lowest bleed levels, and tightest column-to-column reproducibility specifications.

Inlet Liners and Seals

Agilent's Ultra Inert Flow Path deactivation and innovative designs provides maximum inertness to prevent adsorption and ensure accurate sample transfer onto and through the column, and into the detector through a robust deactivated surface.

Fittings and Ferrules

Agilent's newly-released, collared, self-tightening column nut utilizes patented technology to reduce maintenance time, while providing a secure, leak-free seal through hundreds of temperatures cycles.

Gas Filtration and Purification Recommendations

The Gas Clean purification system delivers clean gases, reducing the risks of column damage, sensitivity loss, and instrument downtime. Inserting a gas clean purification system in the gas line immediately before the instrument inlet greatly reduces the level of impurities, thus improving trace analysis.

For more information visit Agilent's Newsroom
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