



Women in water: Changing the face of the industry

H2O shines the spotlight on ten women founders of global water-tech companies in recognition of international women's day

Water trends 2022

An exciting and challenging
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Climate-tech investment

Investors now recognise there are
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Exclusive Interview

U.S. drought accelerates
'water reuse revolution'

Combating Artificial Additive Threats to our Environment and Health

By Atle Mundheim, Chief Technology Officer, M Vest Water

The prevalence of perfluoroalkyl and polyfluoroalkyl substances – often referred to as ‘PFAS’ - in the environment is one of today’s most pressing issues. Norwegian-based M Vest Water is addressing this major global challenge. The company has developed innovative green products that capture PFAS by flocculating these molecules or polymolecules in a manner that enables efficient removal from water and wastewater.

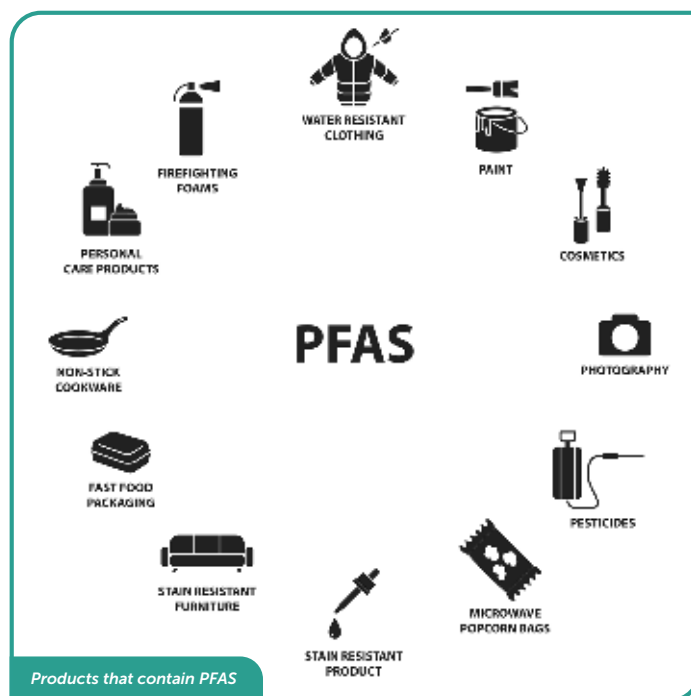
P FAS: the harmful “forever chemicals” that are virtually indestructible. These short or long chain molecules are among the most persistent in the world and are often called “forever chemicals” since they take thousands of years to degrade. Used in industrial activities and to produce consumables, these molecular bonding substances are disposed of in waste and then find their way into and accumulate in ground water and oceans.

Due to their nano sizing, they migrate in the food chain, and finally end up at our table in shellfish, fish, meat, food and water. They are even transported through air and spread over vast areas where they contaminate soil and waterways.

PFAS represent a large class of manufactured chemicals that have been used in firefighting and for stain resistance, water repellents, oil and fat repellents, lubrication, and many other industrial applications since the 1940s. Extreme high temperatures of around 1800 degrees Fahrenheit are required to destroy this ‘eternity product.’

Human exposure to PFAS is a global problem. PFAS have been linked to a number of adverse health effects, and exposure may occur via ingestion, direct contact, inhalation and occupational contact. According to a study executed by The Agency for Toxic Substances and Disease Registry (ATSDR) and published by U.S. Centers for Disease Control and Prevention (CDC), PFAS may cause damage to the liver and heart, also auto immune disturbances, cancer and hormone disturbances.

Today, most people in industrialised nations have measurable amounts of PFAS in their blood. In fact, according to the U.S.



National Groundwater Association, studies estimate that 95% of the U.S. population has been exposed to PFAS and have measurable concentrations in their blood.

Although PFAS are no longer manufactured in the U.S. or Europe, their effect will persist for generations to come. They are still produced in elsewhere around the world, and older products as well as imported materials ranging from textiles to coatings may still contain PFAS. And the damage done since the 1940s shall still haunt us for generations, even if we manage to eliminate these substances from use as of now.

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Tackling the PFAS problem

The good news is that awareness of the PFAS problem has exploded. Major governmental entities, including the European Union and by the European Chemicals Agency and ECHA, and the United States Environmental Protection Agency (EPA), are pursuing action to combat the issues surrounding PFAS.

In Europe, legislation for discharges of PFAS in wastewater, including thresholds in drinking water, has been substantially more stringently regulated, and member countries enforce and allocate financial instruments to implement additional micropollutant treatment steps at existing water treatment plants.

In the U.S., a key development is the passage of the PFAS Action Act 2021 and President Biden's allocation of \$10 billion under the \$1 trillion infrastructure bill to test for and filter PFAS from drinking supplies. This comes as the U.S. Environmental Protection Agency has called PFAS "an urgent public health and environmental issue facing communities across the United States."

It has advocated the approach of getting 'upstream' of the issue by preventing PFAS from entering the environment and holding polluters accountable for their actions and for PFAS remediation efforts.

Technological advancements

M Vest Water has developed a 'green' flocculant called NorwaFloc[®], which combines both polysaccharide-based flocculants and a highly charged coagulant in a single product that is applied in just one dosing step, using M Vest Water's patented technology.

The combination of a biodegradable natural polymer with a highly charged coagulant leads to a complete natural product that achieves even better results compared to traditional synthetic polymers or other biopolymers.

NorwaFloc products are characterized by a significantly improved adhesion to the pollutants in the water and a clearly improved flocculation due to a higher utilisation of the charges. In fact, M Vest Water doubles to triples the charges of the most common and best coagulants available, and in addition, combines this with a flocculant in one and the same product. Normally these are sold separately.

The product was developed into formulations that can capture particles smaller than any other known flocculant/coagulant. In fact, M Vest Water developed a flocculant/coagulant that

can capture molecular and dissolved pollution from water. To our knowledge, no other flocculant/coagulant in the world can do that.

NorwaFloc can, in a conventional coagulation/flocculation process, capture and flocculate dissolved components and low molecular toxins and colloids in the range from below 1 nm upwards and separate these out with the flocculate. The good news is that this ability applies for thousands of contaminants, including PFAS and micropollutants. The specialised NorwaFloc products are able to remove dissolved components in water smaller than 1 nm by capturing and growing them in seconds into large conglomerates easy to separate in any conventional separation device.

The disruptive advantage is that by simply dosing and mixing the NorwaFloc product, these nano pollutants in can be captured in NorwaFloc, which then agglomerates the PFAS molecules into large conglomerates comprising reacted NorwaFloc, which is very easily separated in existing standard water treatment equipment setup with no need for expensive add-on installations (e.g., ozonation followed by like activated carbon or membrane filtration).

In most cases, existing water treatment installations can be used, and in addition, M Vest Water has developed special adapted separation devices for the NorwaFloc that would efficiently remove PFAS from drinking water and wastewater. The NorwaFloc product has been verified to efficiently remove a large number of the most common PFAS products and that this can be done by simply applying NorwaFloc upstream 'off the shelf' media filtration.

NorwaFloc applications

NorwaFloc may substitute any coagulation/flocculation additive in flotation, sedimentation, or mechanical separation of pollutants in wastewater. NorwaFloc is an all-round product that functions in a wide pH range, in hot or cold water, in potable or saline water, for removal of dissolved and suspended contamination in water.

Beside its innovative use to remove PFAS, the product is applicable for general water treatment in almost any kind of water from drinking water to municipal wastewater to industrial, agricultural and aquacultural water and wastewater and even sludge dewatering.

Solving the PFAS problem is a challenging and demanding task, and technological innovation is critical to addressing it. One of the most powerful and promising strategies is to look to green solutions such as those being pioneered by M Vest Water that not only cause no harm to the environment or people around the world, but also can actively and cost-efficiently reduce the amount of these substances going into the land and water, and ultimately affecting our health and wellbeing. ■

Website: mvestwater.com