CHEMWATCH

BULLETIN

Week of 15 May 2026

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GOSSIP

Bacteria-boosted 'living plastic' breaks down on command

New Atlas · 11 May 2026

Living things degrade, die, and decompose. Even when we turn plant and animal material into furniture or clothes, the process is inevitable. On the other hand, left alone, plastics are practically indestructible. Scientists are rethinking this characteristic with a simple but consequential question: What if plastics were alive?

A team of scientists from the Chinese University of Hong Kong has created a living plastic that can “self-destruct” on command. They achieved this by embedding plastic-eating microbes directly into the plastic material. The microbes remain dormant until they are activated by a hot “nutrient broth,” after which they proceed to fully consume the plastic within days, leaving no microplastics behind.

Plastics can take up to 1,000 years to decompose. That’s an awfully long time for something we often use only once. Even then, they leave behind toxic microplastics. Factor in the fact that humans live for an average of 73.8 years, and you realize that we are creating problems that could last generations. The key characteristic of materials that decompose is that they are composed of living cells. This characteristic formed the entire basis of the research study.

“The realization that traditional plastics persist for centuries, while many applications, like packaging, are short-lived, led us to ask: Could we build degradation directly into the material’s life cycle?” said Zhuojun Dai, a corresponding author on the paper.

Certain microbes are capable of breaking down long polymer chains using enzymes they produce. Guess what is made of long polymer chains? Plastics. The scientists took advantage of this ability by engineering Bacillus subtilis spores to produce plastic-degrading enzymes, before embedding the dormant microbes directly into a plastic matrix. When activated by heat, the spores awaken and begin secreting enzymes that chemically break down the material from within.

This is not the first time scientists have used microbes to break down plastic . In fact, the material the research team used, polycaprolactone (PCL), is itself a biodegradable plastic that has previously been degraded using microbe-produced enzymes . However, the team’s innovation is two-fold. First, most previous attempts to degrade PCL relied on a single enzyme system. In contrast, the researchers engineered separate strains of Bacillus subtilis to produce two cooperative polymer-degrading enzymes that work in tandem.

One of the enzymes cuts the long polymer chains at multiple points, rapidly weakening the plastic structure. The second enzyme progressively breaks the fragmented chains down into much smaller...

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This new aluminum could replace rare metals and cut costs dramatically

Science Daily · 16 Mar 2026

A team of scientists at King's College London has identified a new form of aluminum, one of the most abundant metals on Earth, that could offer a far less expensive and more sustainable alternative to widely used rare earth metals.

Led by Dr. Clare Bakewell, a Senior Lecturer in the Department of Chemistry, the researchers created highly reactive aluminum molecules capable of breaking some of the strongest chemical bonds. Their findings, published in Nature Communications , also reveal entirely new molecular structures, opening the door to previously unknown types of chemical behavior.

The researchers reported the first known example of a cyclotrialumane, a compound made of three aluminum atoms arranged in a trimeric -- triangular -- structure. This unusual configuration shows remarkable reactivity. Importantly, the structure remains intact even when dissolved in different solutions, giving it the stability needed for a variety of chemical reactions.

These reactions include splitting dihydrogen and enabling the step-by-step insertion and chain growth of ethene, a simple 2-carbon hydrocarbon. Such capabilities highlight the compound's potential for building more complex molecules.

Metals play a central role in producing both everyday and specialized chemicals used across industry. Many of these processes rely on precious metals like platinum, which are costly and can have significant environmental impacts due to extraction.

Scientists have been searching for alternatives that are easier to obtain and more sustainable. Dr. Clare Bakewell explained: "Transition metals are the workhorses of chemical synthesis and catalysis -- but many of the most useful are becoming increasingly difficult to access and extract -- often being located in regions of political instability, increasing the demand and price.

"Chemists have been looking towards more common elements from the periodic table, and we chose aluminum, as it's super abundant, making it ~20,000 times less expensive than precious metals such as platinum and palladium."

Expanding the Possibilities of Aluminum Chemistry

In addition to designing aluminum compounds for use in chemical synthesis, the team is uncovering entirely new reactions.

Dr. Bakewell said, "What's special about this work, is that we're pushing the boundaries of chemical knowledge. Most excitingly, we can use this aluminum trimer to build completely new compounds with levels of reactivity that have never been observed before -- these include the 5- and 7-membered aluminum and carbon rings formed through reaction with ethene. These capabilities go beyond the transition metals we were originally trying to mimic, to the forefront of...

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Scientists turn CO2 into fuel using breakthrough single-atom catalyst

Science Daily · 17 Apr 2026

Every chemical reaction must overcome an energy hurdle before it can occur. Substances need an initial input of energy to start reacting. Sometimes this barrier is small, like lighting a match. In many industrial processes, however, the required energy is much higher, which increases costs.

To make reactions easier and more efficient, chemists rely on substances called catalysts. These "reaction helpers" reduce the energy needed. The most effective catalysts often contain metals, including rare and expensive ones.

Breakthrough Catalyst Turns CO 2 Into Methanol

Researchers at ETH Zurich have now made a major advance in catalyst design. Their new system significantly lowers the energy needed to produce methanol (an alcohol) from carbon dioxide and hydrogen.

The team also achieved an unusually efficient use of the metal indium. In this catalyst, each individual indium atom acts as its own active site. This is a major shift from traditional approaches, where metals are grouped in particles.

Another key advantage is improved precision. In the past, catalyst development often relied on trial and error. This new design allows scientists to better observe and understand the reactions happening on the surface, opening the door to more deliberate and optimized catalyst development.

"Methanol is a universal precursor for the production of a wide range of chemicals and materials, such as plastics -- the Swiss army knife of chemistry, so to speak," says Javier Pérez-Ramírez, Professor of Catalysis Engineering at ETH Zurich.

Methanol is essential for producing fuels and materials, and it plays a growing role in efforts to move away from fossil fuels. If the hydrogen and energy used in the process come from renewable sources, methanol production could become climate neutral.

This approach also offers a new way to use CO 2 . Instead of releasing it into the atmosphere, it can be captured and turned into a valuable raw material.

Single Atom Catalysts Maximize Efficiency

"Our new catalyst has a single atom architecture, in which isolated active metal atoms are anchored on the surface of a specially developed support material," Pérez-Ramírez explains.

In conventional catalysts, metals are typically grouped into small particles that can contain hundreds or even thousands of atoms. Many of those atoms are not directly involved in the reaction, making the process less efficient.

Single atom catalysts represent a more efficient alternative. By using metals at the level of individual atoms, scientists can make better use of scarce and costly...

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Scientists discover a mysterious silicone pollutant that may be everywhere

Science Daily · 23 Mar 2026

Scientists have identified surprisingly high levels of a little-known silicone pollutant in the atmosphere, raising new questions about possible risks to human health and the climate. The

chemicals, known as methylsiloxanes, are commonly used in cosmetics, industrial products, transportation, and household items. Researchers found these compounds across a wide range of environments, from major cities to rural villages and forests.

The study was led by researchers from Utrecht University and the University of Groningen and published in the journal Atmospheric Chemistry and Physics .

Hidden Silicone Pollution Found Worldwide

Pollutants such as PFAS and microplastics are already known for their widespread presence in the environment. But methylsiloxanes, a class of water-repelling silicone compounds often used as lubricants, have received far less attention.

For years, scientists believed the methylsiloxanes detected in the atmosphere mainly came from evaporation from personal care products and industrial materials. More recently, however, researchers discovered that ships and motor vehicles release a different form of methylsiloxanes made up of much larger molecules that do not easily evaporate.

The new research shows these larger methylsiloxanes are not limited to traffic-heavy locations. Scientists detected them in urban, coastal, rural, and forest environments, suggesting the chemicals are widespread in the atmosphere.

"The findings also suggest that concentrations of methylsiloxane in the atmosphere are much higher than expected," says Rupert Holzinger, associate professor at Utrecht University who co-supervised the study.

According to the researchers, these large molecular methylsiloxanes account for between 2 and 4.3 percent of the total mass of organic aerosols in the atmosphere, making them among the most abundant synthetic compounds detected in airborne particles. By comparison, atmospheric concentrations of PFAS are typically more than a thousand times lower.

Methylsiloxanes added to lubricants are intended to assist with lubrication rather than combustion. However, during engine operation, moving parts such as pistons require constant lubrication, making it unavoidable that small amounts of engine oil enter the combustion chamber.

Because methylsiloxanes are highly heat resistant and do not fully break down during combustion, some survive the intense temperatures inside engines and are released into the atmosphere through exhaust gases.

The highest concentrations were measured in urban regions. Samples collected in the São Paolo metropolitan area in Brazil reached 98 nanograms per cubic meter. The lowest levels appeared in forest locations, including Rugsteliskis, Lithuania, where concentrations measured 0.9 nanograms per cubic meter.

Researchers also collected air samples in Cabauw, a small rural...

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One of the World’s Most Popular Weedkillers May Be Fueling Deadly Superbugs

Sci Tech Daily · 14 May 2026

Scientists have uncovered evidence that one of the world’s most widely used weedkillers may also help dangerous bacteria survive antibiotic treatments.

Each year, antimicrobial resistance (AMR) contributes to an estimated 1.1 million to 1.4 million deaths worldwide. Researchers now say the rise of drug-resistant bacteria may not be driven only by antibiotics. Common weedkillers could also be helping bacteria survive and spread.

“Here we show that the most common species of multidrug-resistant bacteria from hospitals are not only resistant to multiple antibiotic classes but also to high concentrations of the weedkiller glyphosate,” said Dr. Daniela Centrón, a researcher at the Institute of Medical Microbiology and Parasitology in Buenos Aires and the senior author of the study in Frontiers in Microbiology .

“These results suggest that weedkillers—which, unlike antibiotics, are widely applied in agricultural environments—may have the unintended side effect of selecting for AMR among bacterial communities within the soil.”

In 2018 and 2020, Centrón and her team collected 68 bacterial strains from sediment in a protected wetland area in the Paraná Delta north of Buenos Aires. Nearby agricultural land is regularly treated with glyphosate.

Researchers tested how resistant the strains were to 16 commonly used antibiotics, including ampicillin with sulbactam, meropenem, tetracycline, and vancomycin. They also examined resistance to pure glyphosate and glyphosate-based herbicides, which are among the world’s most widely used weedkillers.

The results were compared with 19 bacterial strains taken from local hospitals, including multidrug-resistant species. Another 15 strains came from feedlots and agricultural soils exposed to herbicides.

The hospital strains showed resistance to between one and 16 antibiotics, confirming widespread antimicrobial resistance. About 74% were resistant to carbapenems, a powerful class of broad-spectrum antibiotics often used as a last-resort treatment. Every hospital strain also showed strong resistance to glyphosate and glyphosate-based herbicides.

“This means that if these bacteria enter the environment through untreated wastewater from hospitals, they could go on to thrive in agricultural areas where glyphosate is used,” said first author Dr Camila Knecht from Dr Centrón’s group.

The Paraná Delta samples included 15 bacterial genera, such as Acinetobacter , Pseudomonas , Exiguobacterium , and Chryseobacterium . All showed at least some resistance to glyphosate and related herbicides, even though those chemicals have never been applied inside the reserve. Enterobacter strains tolerated the highest glyphosate levels, reaching up to 80 milligrams per milliliter (about 2.7 ounces per gallon).

By contrast, Bacillus strains commonly found in soil...

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Click chemistry toolbox expanded with 'forbidden' C–C bond forming reaction

Chemistry World · 13 May 2026

A newly reported copper(I)-catalysed allene–ketone addition (CuAKA) offers something rare: a click reaction that forms a robust yet reversible carbon–carbon bond under biologically relevant conditions.

The new click chemistry reaction is unusual in that it can form carbon–carbon bonds

Click chemistry has built its reputation on reliability – fast, selective reactions that work even in messy biological environments. But the permanent bonds it creates can limit applications such as drug delivery and responsive biomaterials, where connections may need to come apart on demand.

‘It is somewhat ironic that the original impetus for click chemistry was the interest in designing and developing functional molecules and yet we were told to aim for really stable linkages, namely those that are devoid of function,’ says Amir Hoveyda at the University of Strasbourg and Boston College. ‘We challenge two general assumptions. [One,] C–C bond forming reactions are not suitable for click chemistry, [and two,] the best click reaction is one that is strongly favored thermodynamically – in other words, it makes an indestructible linkage.’

Carbon–carbon bond formation, particularly via carbonyl addition, has long been considered incompatible with click chemistry’s stringent requirements for selectivity, simplicity and orthogonality. But CuAKA proceeds smoothly in aqueous media and tolerates complex biomolecules, allowing direct coupling of drug-like fragments, such as anticancer candidate camptothecin, to cell penetrating peptides.

‘The two-step sequential reaction is … exciting and interesting,’ comments Yimon Aye at the University of Oxford, who was not involved in the study. ‘The first step, involving π-bond breaking and C–C bond making [with a] carbonyl, is unexpected compared to existing click coupling, and could potentially open up new click coupling avenues.’

The resulting linkage can be selectively cleaved at physiological temperature at low hydrogen peroxide concentrations. Equally important is the reaction’s orthogonality. CuAKA operates alongside established copper-catalysed click processes, including CuAAC and CuPDF, without cross-reactivity, allowing multiple click reactions to be combined within a single molecular system.

Still, translating the chemistry into biological settings may prove challenging. Aye notes that naturally occurring carbonyl groups in cells could complicate selective labelling, while the hydrogen peroxide required for cleavage has diverse biological signalling roles and can be difficult to control spatially. However, she adds that local differences in peroxide concentrations might eventually be exploited for targeted cargo release in specific cellular environments.

‘For use in functional biological contexts,’ Aye says, ‘rigorous road-testing and validations in biological systems for each step of the…

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‘Things are hardly ever as simple as they seem’: classic SN2 textbook mechanism challenged

Chemistry World · 14 May 2026

Chemists have revealed a gas-phase nucleophilic substitution reaction where the molecule first ‘flips over’ before the nucleophile attacks, leaving the molecule’s configuration unchanged. ‘These [substitution reactions] are quite complicated and maybe these are more complicated than we learn,’ says theoretical chemist Gábor Czakó at the University of Szeged in Hungary, who was not involved in the work.

The discovery of an S N 2 reaction that doesn't invert the carbon at the centre shows that there's still plenty to learn about even classic textbook reactions

Bimolecular nucleophilic substitution – commonly known as S N 2 – is one of the most fundamental reactions in chemistry. Chemists often describe the reaction's mechanism as a nucleophile attacking the back face of a central carbon atom, followed by the removal of a leaving group. This Walden inversion mechanism switches the configuration of the tetrahedral carbon.

'This is for S N 2 [reactions] in the lowest transition state,' says Roland Wester at the University of Innsbruck in Austria. 'But then there is also this slightly higher channel where the molecule just behaves differently.'

Chemists have previously discovered other substitution reactions that do not lead to inversion, including 'double-inversion' or 'front-side attack' mechanisms.

Wester's team, along with researchers at the Dalian Institute of Chemical Physics in China, has now uncovered another mechanism where gaseous tert-butyl iodide reacts with chloride ions via a 'flip-over' mechanism.

'The nucleophile comes in, but then instead of [the normal inversion mechanism], the molecule flips over,' explains Wester. Elongation of the carbon–iodine bond allows the molecule to reconfigure before the chloride nucleophile attacks on the same face as the iodine leaving group. Wester says that this retains the original configuration of the molecule.

Firing gaseous chloride ions at an angle of 60° to a beam of tert-butyl iodine molecules allowed the team to study individual substitution reactions. Measuring the velocity and direction of ejected iodide ions gave information about how the substitution had taken place.

The team conducted computational studies of such collisions using a potential energy surface with 39 dimensions – the tert-butyl iodine's 45 total degrees of freedom minus three translational and three rotational modes. 'The potential energy surface is based on energies obtained by density functional theory, which is not the highest quality but for this size of system, it's the best one can do,' explains Czakó.

Repeating both experiments for thousands of collisions revealed the new 'flip-over'...

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New cage-like crystal found in the waste of the world's first nuclear explosion

refractor.io · 14 May 2026

More than 80 years after the world-famous Trinity test showed humanity what to expect from an atomic detonation, researchers are still sifting new discoveries out of its twisted remains.

An analysis conducted on material left from the famous experiment has revealed a cage-like crystal structure known as a clathrate, representing the first example of such a material being formed under the forces generated by a nuclear explosion.

On July 16, 1945, a plutonium bomb was detonated in the New Mexico desert as part of the Manhattan Project. The blast released an energy equivalent to about 21 kilotons of TNT, vaporizing rock and metal support structures at ground zero, and swept up vast quantities of the surrounding desert sand, blending it all together into a spectacularly violent atomic cocktail.

Under extraordinary heat and intense pressure of tens of thousands of atmospheres, this mist of molten sand, clay, metals from the 30 m (100-foot) high test tower, and copper wiring, fused and cooled to form a glassy material dubbed trinitite .

Much like its mythical cousin , kryptonite, trinitite comes in different forms – a common green variety, and a red form containing higher quantities of metals from the mix of copper cabling and framing surrounding the bomb.

Once a popular souvenir collected by tourists visiting the historic site, trinitite is now attracting attention from researchers keen to better understand the kinds of unique chemistry that take place under immense forces.

In 2021 , a study led by University of Florence geologist Luca Bindi identified a new kind of icosahedral quasicrystal in samples of red trinitite.

Using a combination of X-ray diffraction and electron microprobe analyses, Bindi and his colleagues have now found yet another new material in copper-rich droplets of red trinitite, one found in close association with their previous discovery.

"We report the discovery of a previously unknown [calcium, copper, silicon] type-I clathrate formed during the Trinity nuclear test, representing the first crystallographically confirmed occurrence of a clathrate among the solid products of a nuclear detonation," Bindi and his team write in their recently published report .

Clathrate compounds are found throughout nature, commonly trapping other materials in their cage-like structures. While they differ in arrangement from their non-repetitive cousins, the quasicrystal, similarities in the composition of the two trinitite materials made the researchers wonder whether they might share a deeper structural relationship.

"As both the clathrate and the quasicrystal...

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Scientists Just Found a Surprising Way To Destroy "Forever Chemicals"

Sci Tech Daily · 14 May 2026

Scientists have uncovered a new mechanism that may help break down highly persistent PFAS pollutants.

PFAS have earned the nickname "forever chemicals" for a reason. These industrial compounds are so chemically durable that they can survive in the environment and inside the human body for years or even decades. They have been detected in drinking water, food packaging, rainwater, and human blood around the world, making them one of the most difficult pollution problems scientists face today.

Now, researchers may have uncovered an important clue for finally breaking them apart instead of simply filtering them out.

A new study found that intense ultraviolet light can trigger the destruction of PFAS without requiring additional chemicals. More importantly, the researchers identified the key player behind the reaction: hydrogen radicals, highly reactive particles formed from water during UV exposure.

The results challenge earlier theories about how PFAS degradation occurs. Previous studies suggested that other reactive species were mainly responsible. By identifying hydrogen radicals as the primary factor, the researchers gained a clearer picture of the chemical reactions involved.

Understanding the mechanism behind PFAS breakdown could help scientists develop more effective treatment systems.

Hydrogen radicals are highly reactive and capable of attacking PFAS molecules by removing fluorine atoms. Over time, this weakens the compounds and breaks them into smaller, less persistent substances. The researchers also found that the reaction works best under high-energy UV light, especially at wavelengths below 300 nanometers.

According to Associate Professor Zongsu Wei of Aarhus University , who led the study, the findings could guide the development of better cleanup technologies.

“We know that PFAS are extremely stable because of the strong carbon-fluorine bonds, and breaking those bonds is the main challenge. By identifying hydrogen radicals as a dominant driver, we now have a clearer direction for how to design more efficient and sustainable technologies to actually destroy these chemicals, rather than just removing them,” he says.

Wei noted that many current methods only transfer PFAS from one place to another instead of fully eliminating them.

“Today, many technologies can filter PFAS out of water, but they don’t eliminate them. The real goal is degradation: to break the molecules down completely. Understanding the mechanism is essential if we want to achieve that in a green and scalable way.”

The researchers caution that the new findings are not an immediate solution to PFAS pollution. The breakdown process remains relatively slow, and...

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A rare cancer-fighting plant compound has been decoded

Science Daily · 3 Apr 2026

Researchers at UBC Okanagan have uncovered the process plants use to create mitraphylline, a rare natural compound that has attracted attention for its possible cancer fighting properties.

Mitraphylline belongs to a unique class of plant chemicals known as spirooxindole alkaloids. These molecules are recognized for their unusual twisted ring structures and their powerful biological effects, including anti inflammatory and anti tumor activity.

Even though scientists have studied these compounds for years, the exact molecular steps plants use to produce them had remained unknown.

Breakthrough Discovery in Plant Chemistry

That mystery began to unravel in 2023 when Dr. Thu-Thuy Dang's team in UBC Okanagan's Irving K. Barber Faculty of Science identified the first known plant enzyme capable of twisting a molecule into the distinctive spiro shape.

Building on that earlier finding, doctoral student Tuan-Anh Nguyen led new research that uncovered two critical enzymes involved in the production of mitraphylline. One enzyme organizes the

molecule into the correct three dimensional structure, while the second transforms it into mitraphylline itself.

"This is similar to finding the missing links in an assembly line," says Dr. Dang, UBC Okanagan Principal's Research Chair in Natural Products Biotechnology. "It answers a long-standing question about how nature builds these complex molecules and gives us a new way to replicate that process."

Many promising natural compounds are found only in tiny amounts inside plants, making them difficult and expensive to recreate in laboratories. Mitraphylline is one of those rare substances. It exists only in trace quantities in tropical trees such as Mitragyna (kratom) and Uncaria (cat's claw), both members of the coffee family.

Now that researchers have identified the enzymes responsible for shaping and assembling mitraphylline, they have a clearer path toward producing the compound and related molecules in more sustainable ways.

"With this discovery, we have a green chemistry approach to accessing compounds with enormous pharmaceutical value," says Nguyen. "This is a result of UBC Okanagan's research environment, where students and faculty work closely to solve problems with global reach."

Nguyen also reflected on the experience of contributing to the breakthrough.

"Being part of the team that uncovered the enzymes behind spirooxindole compounds has been amazing," Nguyen adds. "UBC Okanagan's mentorship and support made this possible, and I'm excited to keep growing as a researcher here in Canada."

International Collaboration Fuels the Research

The project brought together Dr. Dang's laboratory at UBC Okanagan and Dr. Satya Nadakuduti's research...

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CURIOSITIES

Mexico City is sinking – and NASA is watching it happen

refractor.io · 14 May 2026

Mexico City is trapped in a dangerous feedback loop.

As groundwater is pumped from beneath the city, the ground subsides, with some entire regions sinking far faster than others. This lopsided descent damages pipes, sewers, and wells, leading to leaks and water loss. To compensate, the city must pump even more groundwater, accelerating the sinking process even further.

Scientists have tracked this problem for years . The city's subsidence was first identified by an engineer called Roberto Gayol in 1925.

Recently, though, NASA and the Indian Space Research Organization (ISRO) trained one of the world's most powerful radar systems on the sinking metropolis.

The NASA-ISRO Synthetic Aperture Radar (NISAR) satellite can track changes in Earth's surface with unprecedented precision. Trained on Mexico City, it revealed how the city's subsurface was shifting, highlighting regions subsiding more than half an inch (2 cm) per month.

Mexico City, once known as the Aztec city of Tenochtitlan, was built on an island in Lake Texcoco in the 14th century. Though that lake was drained over centuries, Mexico City today still stands above an aquifer – a layer of porous rock saturated with water.

Since Mexico City's subsidence problem was first identified in 1925, the capital city's population has grown to more than 22 million. Unsurprisingly, more people mean more problems. Groundwater pumping has snowballed as demand for water has steadily risen, with one report stating it accounts for roughly 60% of the city's total supply.

The problem is sharply illustrated in the new NISAR image. While the dark blue marks represent areas subsiding more than half an inch every month, the areas marked in yellow and red are likely "residual noise signals that are expected to decrease as NISAR collects more data."

NISAR features a 39-ft (12-m) wide, unfolding radar antenna reflector, making it the largest NASA has ever sent to space. The satellite monitors the Earth twice every 12 days. It cost US$1.5 billion to build, making it the most expensive Earth-imaging satellite in history.

The new NISAR images, captured between October 2025 and January 2026, show that the Benito Juarez International Airport is located inside one of those dark blue spots.

"Images like this confirm that NISAR's measurements align with expectations," says Craig Ferguson, deputy project manager at NASA.

It's far from being the only important transport infrastructure affected in the city. In 2021, an overpass collapsed resulting in 26 deaths. This...

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A common constipation drug shows surprising power to protect kidneys

Science Daily · 19 Feb 2026

Chronic kidney disease (CKD) affects hundreds of millions of people worldwide and is one of the leading causes of kidney failure. As the disease progresses, many patients eventually need dialysis to survive. While current treatments can help slow damage, there are still no approved medications that directly restore kidney function.

Researchers at Tohoku University Graduate School of Medicine uncovered an unexpected possibility involving a drug that has long been used to treat constipation. In a clinical trial, the medication lubiprostone appeared to slow the decline of kidney function in patients with moderate CKD, raising hopes for an entirely new approach to kidney disease treatment.

"We noticed that constipation is a symptom that often accompanies CKD, and decided to investigate this link further," explains Abe. "Essentially, constipation disrupts the intestinal microbiota, which worsens kidney function. Working backwards, we hypothesized that we could improve kidney function by treating constipation."

Doctors have increasingly focused on what researchers call the "gut kidney axis," the complex relationship between intestinal bacteria and kidney health. People with CKD often experience constipation and imbalances in gut microbes, which can contribute to inflammation and the buildup of harmful compounds in the body.

Earlier research had hinted that improving gut health might help protect the kidneys, but evidence in humans remained limited. To explore the idea further, researchers launched the multicenter Phase II clinical trial known as the LUBI-CKD TRIAL across nine medical institutions in Japan.

The study enrolled 150 patients with moderate chronic kidney disease. Participants received either lubiprostone or a placebo, allowing scientists to compare how the treatment affected kidney function over time.

The results surprised the researchers. Patients who received either 8 µg or 16 µg doses of lubiprostone showed a slower decline in kidney function compared with those in the placebo group. Kidney performance was measured using estimated glomerular filtration rate (eGFR), one of the most widely used indicators of kidney health.

Researchers reported that the protective effect appeared dose dependent, meaning higher doses were linked to greater benefits. The 16 µg group showed particularly promising preservation of kidney function signals during the 24 week trial period.

How a Constipation Drug May Protect the Kidneys

Scientists then investigated why the drug appeared to help the kidneys.

Their analysis pointed to changes in the gut microbiome. Lubiprostone increased the production of spermidine, a naturally occurring compound tied to healthier mitochondrial activity. Mitochondria are often described as the...

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New psychedelic-like drugs could treat depression without making you trip

Science Daily · 8 Mar 2026

Researchers at UC Davis have developed a light driven technique that converts amino acids, the molecules that make up proteins, into compounds that behave similarly to psychedelics in the brain. These newly created molecules activate serotonin 5-HT 2A receptors, which are associated with brain cell growth and are considered promising targets for treating conditions such as depression, PTSD, and substance-use disorder. Unlike traditional psychedelics, however, the compounds did not produce key hallucinogenic-like behaviors in animal testing.

The findings were published in the Journal of the American Chemical Society .

"The question that we were trying to answer was, 'Is there whole new class of drugs in this field that hasn't been discovered?" said study author Joseph Beckett, a Ph.D. student working with Professor Mark Mascal, UC Davis Department of Chemistry, and an affiliate of the UC Davis Institute for Psychedelics and Neurotherapeutics (IPN). "The answer in the end was, 'Yes.'"

The work could lead to a more efficient and environmentally friendly approach for discovering serotonin-targeting drugs that provide some of the therapeutic effects linked to psychedelics without dramatically altering perception.

"In medicinal chemistry, it's very typical to take an existing scaffold and make modifications that just tweak the pharmacology a little bit one way or another," said study author Trey Brasher, also a Ph.D. student in the Mascal Lab and an affiliate of IPN. "But especially in the psychedelic field, completely new scaffolds are incredibly rare. And this is the discovery of a brand-new therapeutic scaffold."

Building New Psychedelic-Like Molecules With UV Light

To create the compounds, the researchers combined several amino acids with tryptamine, a naturally occurring metabolite derived from the essential amino acid tryptophan. The team then exposed the resulting molecules to ultraviolet light, triggering chemical changes that produced entirely new compounds with potential medical applications.

Using computer modeling, the scientists evaluated how strongly 100 of the new compounds interacted with the brain's 5-HT 2A serotonin receptor.

From that group, five compounds were selected for more detailed laboratory testing. Their activity levels ranged from 61% to 93%. The strongest performer acted as a full agonist, meaning it could trigger the maximum biological response possible from the 5-HT 2A receptor system.

Because D5 fully activated the same receptor targeted by psychedelics, the scientists expected it to produce head twitch responses in mice, a widely used indicator of hallucinogenic-like effects.

Even though D5 strongly activated the receptor, the mice did...

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Researchers Solve 15-Year Mystery Behind Cancer-Causing Gut Toxin

Sci Tech Daily · 14 May 2026

A new study reveals the hidden mechanism a common gut bacterium uses to damage the colon, solving a mystery that has puzzled scientists for years.

Researchers have known since a landmark 2009 study that the common gut bacterium Bacteroides fragilis can promote colon tumor growth that may lead to colorectal cancer. The bacterium does this by releasing a toxin that damages the colon lining. However, scientists had not understood exactly how the toxin attaches to colon cells.

Now, a research team led by scientists at the Johns Hopkins Kimmel Cancer Center, Bloomberg~Kimmel Institute for Cancer Immunotherapy, and the Johns Hopkins University School of Medicine has uncovered the missing step. Their study, published in Nature , found that the B. fragilis toxin known as BFT must first bind to a host receptor called claudin-4 before it can harm cells. The research received partial funding from the National Institutes of Health .

“We’ve made several attempts over time to identify the receptor, so this is an exciting moment,” says senior author Cynthia Sears, M.D., Bloomberg~Kimmel Professor of Cancer Immunotherapy and professor of medicine at Johns Hopkins. “Understanding how bacterial toxins work can open doors to new approaches for detection and therapy for associated diseases, including diarrhea, colorectal cancer, and bloodstream infections.”

The discovery has already helped researchers develop a molecular decoy that blocked the toxin’s harmful effects in animal studies, suggesting a possible way to prevent B. fragilis damage in the colon.

B. fragilis is found in up to 20% of healthy people and is highly effective at triggering colon inflammation and tumor formation. Earlier research from Sears’ lab showed that BFT causes chronic gut inflammation by cutting E-cadherin, a protein that helps maintain the colon’s protective barrier.

In a previous Nature Medicine study, Sears and her colleagues demonstrated that BFT activity contributes to colon tumor development. However, the toxin did not seem to attach directly to E-cadherin, suggesting another mechanism was involved.

To uncover that mechanism, Maxwell White, an M.D./Ph.D. candidate in the Sears lab, led a genomewide CRISPR screen in collaboration with Matthew Waldor’s lab at Harvard Medical School. By systematically disabling genes in colon epithelial cells, the researchers identified claudin-4 as the critical link. When claudin-4 was removed, BFT could no longer bind to the cells, leaving E-cadherin unaffected.

“It took a while to get the assay working and validate the approach, but once we were able to do...

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Plants may literally hear the sound of approaching rain, study finds

refractor.io · 12 May 2026

Stuart Thompson , University of Westminster , The Conversation

Researchers at MIT have suggested that rice seeds can hear the sound of rain, according to a new study . MIT calls it “the first direct evidence that plant seeds and seedlings can sense sounds in nature”. Perhaps surprisingly, the effects reported in this new study are not as radical as they may appear.

Playing music to your plants may sound eccentric, but a few previous studies have found it has some effect. For example, a 2024 study found bok choi grew better to classical music but less well to rock and roll. Nor is this an isolated phenomenon. Sound can have a range of effects on plant behaviour.

For example, some flowers use the pitch of an insect's buzz to determine whether they will release their pollen. Both Arabidopsis (thale cress) and tobacco plants produce higher levels of toxins, such as nicotine, in response to the sound of caterpillars chewing on neighbouring plants. There have also been reports that notes from a synthesiser can increase seed germination and seedling growth in mung beans , cucumber, and rice .

In contrast to previous experiments using electronic tones from a speaker, the MIT researchers instead tested the effect of a natural sound upon rice germination: the fall of rain. Rice can grow in soil or under water, and the researchers started by measuring the sound made by raindrops falling onto shallow puddles similar to the paddies they sowed seed in. The volume of sound waves created by drops landing on water was incredibly loud, equivalent to someone shouting straight into your ear, but mostly at frequencies too low or too high for a human to hear.

They then poured simulated rain on some of the pools containing rice and compared their rate of sprouting with seeds in still water. They found that although water droplets imitating light rain had little effect, heavier rain increased germination, and the heaviest by more than 30%.

They also picked up on an important clue from a previous study about how the rice might be detecting the sound. A 2002 study found that mutant Arabidopsis plants, which can't make starch, didn't respond to vibration in the same way that normal Arabidopsis do.

Sound waves are just vibrating energy traveling through a gas, liquid, or solid that makes objects, such as the eardrum membranes we use to hear,...

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This 275-million-year-old animal had a twisted jaw like nothing alive today

Science Daily · 14 May 2026

In a dry riverbed deep within a forest near the Amazon in Brazil, paleontologists uncovered a fossilized jawbone from a previously unknown ancient animal. As their excavation continued, the team found eight more similar jawbones, each about six inches long. However, they did not recover any additional bones that could clearly be matched to a full skeleton.

Even so, these isolated jaws revealed something remarkable. The fossils belonged to a species that lived around 275 million years ago and would have been considered a "living fossil" even in its own time. The jaws were also highly unusual, with a twisted shape. Some of the teeth pointed outward and sideways, while rows of smaller teeth lined the inner surfaces. This structure suggests the animal may have been among the earliest of its kind to grind plant material.

In a study published in Proceedings of the Royal Society B , researchers formally described the species and named it Tanyka amnicola. The name Tanyka comes from the Indigenous Guaraní language and means "jaw," while amnicola translates to "living by the river."

"Tanyka is from an ancient lineage that we didn't know survived to this time, and it's also just a really strange animal. The jaw has this weird twist that drove us crazy trying to figure it out. We were

scratching our heads over this for years, wondering if it was some kind of deformation," says Jason Pardo, the study's lead author, who worked on the project during his post-doctoral fellowship at the Field Museum in Chicago. "But at this point, we've got nine jaws from this animal, and they all have this twist, including the really, really well-preserved ones. So it's not a deformation, it's just the way the animal was made."

Tanyka belongs to a broad group of vertebrates known as tetrapods, which includes all four-limbed animals with backbones such as reptiles, birds, mammals, and amphibians. The earliest tetrapods, called stem tetrapods, eventually split into two major branches. One group evolved to lay eggs on land, leading to reptiles, birds, and mammals. The other group continued laying eggs in water, giving rise to modern amphibians like frogs and salamanders.

Even after this split, some stem tetrapods continued to exist alongside their more recently evolved relatives. Tanyka was one of these holdovers from an older lineage.

A similar pattern can be seen in mammals. Early mammals laid eggs, while later groups evolved...

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Scientists Create “Living” Materials That Crawl, Walk, and Dig on Their Own

Sci Tech Daily · 14 May 2026

Physicists studying active matter — materials that can use their own internal energy to respond to forces — have uncovered surprising behaviors that challenge conventional ideas in mechanics.

Materials that bend, snap, crawl, or even dig on their own may sound like science fiction, but physicists are now building systems that can do exactly that.

Researchers from the universities of Amsterdam, New South Wales, and Cambridge are exploring a strange category of materials known as active matter. Unlike ordinary materials, active matter can draw on internal energy to respond dynamically to outside forces. Their latest experiments reveal behaviors that challenge some of the most established rules in mechanics and could eventually help shape the next generation of soft robotics and adaptive machines.

Most materials people encounter every day are passive. Steel beams, rubber bands, glass, and concrete only move or deform when something external pushes, stretches, or compresses them.

Active matter works differently. These systems continuously consume energy and convert it into motion or mechanical changes. Nature is full of examples. Schools of fish move in coordinated waves, bird flocks shift direction almost instantly, and living cells reorganize themselves without any central controller.

The building blocks of the new materials are rods connected by small motors that make the material active. The interactions are non-reciprocal: when pressed from one side the system reacts in a different way than when pressed from the other side. Credit: Image by the authors.

Active matter is not limited to biology. Scientists can also create it in laboratories using relatively simple components.

Over the past several years, researchers from Amsterdam, Cambridge, and New South Wales have developed active materials made from rods, rubber bands, and tiny motors. These systems display

unusual and potentially useful behaviors. Two recent studies from the team have been accepted for publication.

One example begins with a simple comparison. If you compress a paper ticket between your fingers, it buckles in one direction. Push the bent section inward, and it suddenly snaps to the opposite side. Because the ticket is inactive matter, this buckling and snapping only happens once under external pressure.

The researchers found that active materials behave very differently during the same process.

To create an active version of the system, the team linked rods together into a chain and placed small motors at the joints. These motors created non-reciprocal interactions, meaning one rod could respond differently to motion...

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Scientists discover the strange way CO2 cools part of Earth’s atmosphere

Science Daily · 21 Jan 2026

As the Earth's surface and lower atmosphere continue to warm, another part of the planet's atmosphere is doing the opposite. Far above the ground, the upper atmosphere has been cooling significantly for decades. Scientists have long recognized this unusual contrast as one of the clearest signals of human driven climate change, but the exact physics behind it remained uncertain.

Now, researchers at Columbia University say they have finally uncovered the mechanism responsible. Their new study explains how carbon dioxide (CO 2) interacts with different wavelengths of light in ways that cool the upper atmosphere while warming the planet below.

"It explains a phenomenon that's a fingerprint of climate change, has been known to occur for decades, and has not been understood," says Robert Pincus, a research professor of ocean and climate physics at Lamont-Doherty Earth Observatory, which is part of the Columbia Climate School, and co-author of the study published in Nature Geoscience .

Near Earth's surface, CO 2 traps heat that would otherwise escape into space, contributing to global warming. But conditions are very different higher up in the atmosphere.

In the stratosphere, the atmospheric layer stretching from about 11km to 50 km above Earth's surface, CO 2 behaves more like a cooling system. The molecules absorb infrared energy rising from below and then release part of that energy back into space. As atmospheric CO 2 levels increase, the stratosphere becomes even more effective at shedding heat, causing temperatures there to drop.

Scientists first predicted this effect in the 1960s through climate models developed by climatologist Syukuro Manabe, whose work later earned a Nobel Prize. Since the mid-1980s, the stratosphere has cooled by about 2 degrees Celsius. Researchers estimate that this cooling is more than 10 times greater than it would have been without human generated CO 2 emissions.

Although scientists understood the broad idea behind stratospheric cooling, many of the detailed processes remained unresolved.

"The existing theory was incredibly insightful, but at the moment we lack a quantitative theory for CO 2 -induced stratospheric cooling," says Sean Cohen, a postdoctoral research scientist at

Lamont-Doherty Earth Observatory, which is part of the Columbia Climate School, and the study's lead author.

To solve the puzzle, Cohen worked with Pincus and Lorenzo Polvani, a geophysicist in Columbia Engineering's Department of Applied Physics and Applied Mathematics. The team built mathematical models that identified the major processes driving stratospheric cooling. They repeatedly...

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Stripped down bacterium functions with one less amino acid than the rest of life on Earth

Chemistry World · 11 May 2026

Scientists altered a bacterium’s DNA following advice from deep learning models, which allowed the creation of an organism that could manufacture proteins out of just 19 amino acids, rather than the usual 20 all life makes use of

A bacterium whose ribosome is made up of proteins containing just 19 amino acids, instead of the 20 used by all life on Earth today, has been engineered by rewriting its genetic code. The work constitutes a key step towards a complete organism that uses fewer amino acids than a natural one – something that could be useful for synthetic biology and provide researchers with the opportunity to study the evolution of organisms with compressed genomes.

Roughly 500 amino acids are found in nature. For reasons that are unclear, 20 of them are used by all organisms in the proteins they use as the core building blocks of their cells. In some rare instances organisms have added a 21st or 22nd amino acid, but no natural organism has functioned with fewer, despite computer modelling suggesting that as few as nine to 12 could hypothetically encode almost all protein folds. Ancient organisms probably used far fewer amino acids than life does today.

The 20 amino acids used to assemble proteins in a cell’s ribosome are encoded by a ‘universal codon table’ comprising 64 possible combinations of three DNA base pairs (codons), many of which code for the same amino acid. Previous work has compressed organisms’ genetic codes by removing some of these redundant triplets. In 2025, researchers in the UK produced Escherichia coli that encoded all 20 amino acids in a 57-codon genetic code , cutting some redundancy in the codon table.

In the new work, the researchers went beyond these ‘synonymous’ mutations and altered E. coli ’s genome so that it did not code for the incorporation of one amino acid into the proteins that make up ribosomes. They studied the least conserved amino acids across proteins that performed the same functions in different species, finding that isoleucine was often replaced with another amino acid – most commonly valine – at the same position, so they concluded it might be dispensable. They then introduced genes into E. coli in which the isoleucine in ribosomal proteins was replaced by valine. The organisms survived in some cases, but often they died or didn’t thrive.

The difference between isoleucine and valine is not that great,...

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Physics in uncharted waters: The mysteries of marine snow

Phys Org · 14 May 2026

Can "snow" fall in the ocean and influence the climate of the entire planet? It turns out that it can. Research conducted by scientists from the Faculty of Physics at University of Warsaw, published in the Journal of Fluid Mechanics , helps us understand how microscopic flakes of dead organic matter collide and sink into the deep ocean, transporting vast amounts of carbon and affecting the pace of global warming.

In the waters of the world's oceans, particles of dead organic matter are constantly sinking. Due to their intricate shapes, which resemble snowflakes, these particles are known as marine snow. Its descent to the seafloor transports vast amounts of carbon from the ocean surface (where atmospheric carbon dioxide dissolves) to the depths. This is one of the critical phenomena controlling the carbon cycle in the atmosphere and, consequently, the process of global warming. The amount of carbon that ultimately settles on the bottom depends on sedimentation dynamics, which are still poorly understood.

As they fall, these "snowflakes" sometimes stick together , affecting their sinking rate. The fundamental question for assessing the impact of this phenomenon on sinking rates is: How often do these collisions occur? Until now, answers were limited to specific, simplified situations, and the applicability of these approximations was not clearly defined. The new research demonstrates how to reconcile existing models and allows for a more accurate determination of collision frequency, which will enable a better investigation into the role of aggregation in oceanic carbon deposition processes.

The authors verified theoretical models previously used in oceanography and marine ecology. According to their findings, snowflakes can collide in two ways: via Brownian motion—random motion of particles within the medium—and via direct "sweeping" of slower, smaller particles by those larger and faster. If only one of these mechanisms dominates, the number of collisions is easy to determine. However, in actual marine snow, both mechanisms play a role. Reconciling approaches from different fields has, until now, eluded researchers.

Full analysis is made possible through computer simulations that account for both collision mechanisms simultaneously. The frequency of collisions then depends on the size of both particles, their relative settling velocity, and the diffusion coefficient. The results confirmed that to correctly determine collision frequency, it is essential to consider both mechanisms—the diffusive wandering of small particles and the direct capture during descent. Using only one of these for modeling, as per the current...

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REACH UPDATE

Call to renew membership of the Scientific Committee on Consumer Safety (SCCS) for the term 2027-2031

ECHA · 6 May 2026

Target audience

The European Commission invites scientists to join its Scientific Committee on Consumer Safety - SCCS.

Why we are consulting

The Scientific Committee established under Commission Decision (EU) 2024/1514 provides the Commission with scientific advice and safety assessment in the areas of consumer safety, and cosmetic ingredients in particular.

The Committee consists of a maximum of 19 members.

Successful candidates are expected to be well-established scientists with at least 10 years of professional experience and multi-disciplinary accomplishments.

Proven experience in risk assessment related to consumer safety is essential. Experience in safety assessment of cosmetic ingredients would be an asset.

Preference will be given to experts with (more than one) areas of expertise relevant to chemical safety, exposure, and hazard assessment: see details in the text of the call.

See also the leaflet.

Members are appointed to the Scientific Committee for a term of five years, starting on 1st January 2027.

More information on the work of the SCCS, current composition as well as their past opinions can be found here: Scientific Committee on Consumer Safety (SCCS) - Public Health.

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REGULATORY UPDATE

ASIA PACIFIC

Lead may contaminate our clothes but there's no requirement to test for it

ABC News · 4 May 2026

How did the leather in your shoes get so soft, or the colour in your shirt so vibrant?

Unfortunately, the answer can easily be treatment with a hazardous substance.

Often, the cheapest way to make a fabric involves treatment with substances like lead.

But in a fast-changing industry with little regulation, it's hard to tell what's happened to your garments while they were being made.

So, should we be concerned about contaminants in our clothes, and is there anything we can do to avoid them?

Lead in children's clothing

Kamila Deavers, a chemist at Marian University in the US, first became interested in lead contamination after blood tests showed her young daughter briefly had elevated lead levels.

She began to test items around her home to find possible sources of the toxic metal, including clothing.

Lead and other heavy metals have been widely used as "mordants" in the textile industry: compounds that fix dyes in place, helping them keep colour for longer.

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4,4'-Methylene bis(2-chloroaniline) [101-14-4] (MOCA) compliance campaign

Work Safe QLD · 7 May 2026

Between October 2023 and August 2024, Workplace Health and Safety Queensland (WHSQ) audited businesses who were using, handling, storing or supplying 4,4'-Methylene bis(2-chloroaniline) [101-14-4] (MOCA).

The campaign was undertaken to ensure persons conducting a business or undertaking (PCBUs) supplying, using, handling or storing MOCA were complying with requirements of the Work Health and Safety Regulation 2011 (WHS Regulation) and eliminating or minimising (so far as is reasonably practicable) risks of worker exposure.

Background

MOCA is classified as a restricted carcinogen in Schedule 10 of the WHS Regulation.

MOCA is a Category 1B carcinogen, presumed to cause cancer in humans.

Uses - primary use is as a curing agent for isocyanate-based polyurethane products (for example, industrial tyres, rollers and gaskets).

Health risks - occupational exposure occurs primarily through skin absorption (ingestion and inhalation are also possible). MOCA is structurally similar to benzidine (a known bladder carcinogen) and is associated with bladder cancer in humans.

Legislation - PCBUs cannot use, handle, or store MOCA without an authorisation or exemption from the Regulator. Suppliers must not supply MOCA without evidence of such authorisation.

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Restricting three new Stockholm Convention POPs: chlorpyrifos, MCCPs and LC-PFCAs

EPA NZ · 7 May 2026

We sought feedback on the proposal to restrict three persistent organic pollutants (POPs). These are chlorpyrifos, MCCPs and LC-PFCAs.

Submissions closed on Friday 17 April 2026.

In May 2025, three new chemicals were added to the Stockholm Convention. This is an international treaty to eliminate or restrict the production and use of POPs – highly toxic chemicals that do not readily degrade.

Because New Zealand signed this convention, we must restrict the chemicals here. To do this, we need to add them to Schedule 2A of the Hazardous Substances and New Organisms Act 1996 (HSNO Act).

What happens next

The EPA reports on the consultation to the Minister of the Environment and we publish the report on our website.

The Minister seeks Cabinet approval to amend Schedules 1AA and 2A of the HSNO Act to include these chemicals, including any exemptions.

If approved, the changes are adopted into the HSNO Act.

Under the Stockholm Convention, these changes need to be included in the HSNO Act by 16 December 2026.

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AMERICA

Officials knew carpet mill chemicals were polluting the region’s drinking water; they didn’t tell residents

Independent · 7 May 2026

Growing up in northwest Georgia, Stormy Bost's life was intrinsically linked to water.

Summers were spent plucking crawdads from the neighborhood creek and playing in its cool depths, racing home for dinner as the sun set. Waiting for her were pitchers of sweet tea, brewed by her family using tap water.

"Your family's going through a gallon every day or two, and it's cheap," Bost recalled. "But it comes from the faucet."

As a parent, Bost continued this tradition for her own children until a few years ago, when she discovered the local tap water contained toxic chemicals known as PFAS.

Bost and her husband are raising two daughters in Calhoun, the same small river town dominated by the region's multibillion-dollar carpet industry where she was reared.

For decades, textile mills relied on PFAS in popular brands like Stainmaster and Scotchgard for stain resistance.

Some of these chemicals, which didn't adhere to carpets, were flushed with industrial wastewater into local sewer pipes and, eventually, the region's rivers. The same odorless, colorless chemicals in the tap water have accumulated in Bost's body, blood tests show.

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Overview: substances of potential concern - the Watch List

Government of Canada · 28 Apr 2026

In June 2023, the Canadian Environmental Protection Act, 1999 (CEPA) was amended as a result of Bill S-5, Strengthening Environmental Protection for a Healthier Canada Act (now SC 2023, ch. 12). The new section 75.1 of the amended CEPA states that "the Minister of the Environment shall compile and may amend from time to time a list that specifies substances that the Minister of the Environment and the Minister of Health have reason to suspect are capable of becoming toxic or that they have determined to be capable of becoming toxic" (the "Watch List"). Substances on Schedule 1 to CEPA cannot appear on the Watch List.

The Watch List is a legislated requirement under CEPA. The Watch List seeks to provide greater transparency in the identification of substances of potential concern to interested parties and the public.

The Watch List does not impose any requirements or restrictions on a substance or class of substances. The Minister of the Environment may add a substance to the Watch List when the Minister and the Minister of Health have a reason to suspect it is capable of becoming toxic, or if it has been determined it to be capable of becoming toxic.

Approach

In April 2026, the final Watch List Approach was published. The approach describes the process and considerations associated with adding and removing substances from the Watch List.

In December 2024, the proposed Watch List Approach was published for a 60-day public comment period. Comments received were considered in the development of the final approach.

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EUROPE

Commission seeks views on additional exemptions to portable batteries removability rules

European Commission · 28 Apr 2026

The European Commission launched a public consultation today (28 April) on new rules setting out additional product exemptions from EU requirements on the removability and replaceability of portable batteries.

Under the EU's Batteries Regulation, portable batteries in products sold in the EU must generally be removable and replaceable by consumers. This requirement helps extend products' lifetime by allowing battery replacements and supports recycling by making it easier to collect used batteries.

However, some products, such as medical devices and so-called "wet appliances" (for example, toothbrushes or water flossers), are exempt from this requirement, mainly for safety reasons. In these cases, batteries only need to be removable and replaceable by independent professionals.

The Commission is now proposing to add six new product categories to the list of exemptions. This includes wearable devices such as smartwatches and fitness trackers, electric toys, and products within the scope of the ATEX Directive (equipment used in explosive atmospheres such as explosion-proof motors, sensors, pumps or forklift trucks).

The consultation is open to all interested parties, including citizens, businesses, non-governmental organisations, public authorities and academia. All stakeholders are invited to share their views on the draft legislation by 26 May.

The new rules will take the form of a delegated act under the Batteries Regulation.

The Commission is also planning to update the existing guidelines on the removability and replaceability of portable batteries to guide product manufacturers on applying the new derogations.

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Toxic chemical fears may see Ireland's furniture fire safety law scrapped

The Journal · 4 May 2026

Ireland's regulations are an outlier in the EU. Ikea has called for changes to be made quickly.

THE GOVERNMENT IS considering whether to scrap Irish fire-safety standards for household furniture that lead to the use of toxic flame-retardant chemicals.

The Department of Enterprise said the review was prompted by a report by the European Chemicals Agency on the latest science on aromatic brominated flame retardants.

This highlighted potential health hazards including carcinogenicity, neurotoxicity, endocrine disruption and reproductive toxicity. The chemicals are bioaccumulative in humans and wildlife, meaning they build up in tissue faster than they can be excreted, and are persistent in the environment.

Brominated flame retardants have been found in Irish women's breastmilk.

These chemicals are used to comply with Ireland's fire safety tests for upholstered furniture such as couches, armchairs and headboards, as well as for fillings for mattresses. Upholstered furniture is tested with an open flame in Ireland, which means heavy use of chemicals is needed to pass.

Swedish furniture giant Ikea told The Journal it welcomed the Irish government's proposals to reduce "unnecessary over-reliance on chemical flame retardants" and it wants to see the legal framework updated "quickly".

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Paint rules cut harmful air pollution by 60% in 15 years – but policy lags behind

NCAS · 6 May 2026

Changes to the way decorative paints and varnishes are made have significantly reduced harmful air pollution emissions over the past two decades, according to new research involving scientists from the National Centre for Atmospheric Science (NCAS).

The findings show that regulation of paint-derived volatile organic compounds (VOCs) works. But, they also underline the need for air quality policy and industry standards to be updated to reflect new chemical compositions in paint.

Air pollution from volatile organic compounds

Most VOCs are safe to breathe in low concentrations, although they can have serious implications for our health if concentrations build up in poorly ventilated spaces – which in part explains why we are advised to open windows when painting indoors, and why the 1999 Solvents Directive and 2004 Paints Directive were established. When those same VOC fumes pass outside they go on to form harmful photochemical smog.

Since then, there has been a major decline in VOCs emitted from paints in the UK. This is linked to the transition away from hydrocarbon solvents, to a wider range of different chemicals.

"Rules on product labelling followed the 1999 and 2004 Directives, and now every paint p

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Commission decides to refer Spain to the Court of Justice of the European Union for failing to comply with the Urban Wastewater Directive

European Commission · 29 Apr 2026

Today, the European Commission decided to refer Spain to the Court of Justice of the European Union for failing to fully comply with the collection, treatment and monitoring obligations set in the Urban Waste Water Treatment Directive (Council Directive 91/271/EEC).

Untreated wastewater can put human health at risk and pollutes lakes, rivers, soil and coastal waters and groundwater. The Directive protects both water quality and human health by requiring that Member States collect and treat their urban wastewater for all agglomerations of 2,000 people or more before it is discharged into the environment. Member States should also ensure that discharges from urban wastewater treatment plants remain compliant over time with the Directive's

requirements. Correct implementation of the Urban Wastewater Treatment Directive thus contributes to water resilience across the EU.

In 15 agglomerations, Spain still needs to ensure that they benefit from wastewater collection systems and that, where the use of individual or other appropriate systems is justified, they achieve the same level of environmental protection of a collecting system.

In 39 agglomerations, Spain is still failing to ensure secondary treatment of the entire agglomerations' pollution load and/or fails to meet the treatment requirements for the discharges into normal areas after treatment.

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Commission decides to refer Greece, Malta and Portugal to the Court of Justice of the European Union to ensure transposition of the reinforced rules to promote renewable energy

European Commission · 29 Apr 2026

Today, the European Commission decided to refer Greece, Malta and Portugal to the Court of Justice of the European Union for failing to transpose into national legislation the EU's recent rules to promote renewable energy, which were introduced by Directive (EU) 2023/2413 amending Directive (EU) 2018/2001 on the promotion of energy from renewable sources.

The new rules aim to accelerate the development of renewable energy and the roll-out of homegrown clean energy across the EU in order to reduce greenhouse gas emissions, strengthen energy independence and lower energy prices. It seeks to deploy renewable energy in all sectors of the economy, not only in the power sector, but also and especially in those sectors where progress is more difficult like heating and cooling, buildings, transport and industry, where new or strengthened targets have been set. They introduce horizontal and cross-cutting measures to promote the deployment of renewables, such as the strengthening of guarantees of origin, facilitating energy system integration through the promotion of electrification and renewable hydrogen, and safeguards to ensure a more sustainable bioenergy production. The promotion of renewable energy is crucial for Europe's competitiveness and path to climate neutrality and a key element of the Affordable Energy Action Plan as well as the REPowerEU plan.

Greece, Malta and Portugal were required to transpose most of the new provisions of the Directive by 21 May 2025, promoting the development of renewables in all sectors (electricity, heating and cooling, transport, buildings and industry). The Commission sent these three Member States a letter of formal notice in July 2025 for not having notified any transposition measures. In December 2025, after assessing their replies, the Commission sent a reasoned opinion to Greece and Portugal for not having notified any transposition measures, and to Malta for not having notified a correlation table or explanatory document specifying where each provision of the Directive has been transposed. Failure to notify transposition measures or to provide sufficiently clear and precise information on how the Directive has been transposed can be pursued and fined under Article 260(3) TFEU since it is considered that, in such a situation, no transposition has taken place.

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HAZARD ALERT

Methyl Isobutyl Ketone

15 May 2026

Methyl isobutyl ketone (MIBK) is the organic compound with the formula (CH3)2CHCH2C(O)CH3. [1] It is a colourless liquid with a faint odour like camphor. Methyl isobutyl ketone is a flammable liquid. It is partially soluble in water. [2]

Uses [3]

Methyl isobutyl ketone is used as a solvent for manufacturing: paints, rubbers, pharmaceuticals, chemicals and machinery. It is used in the semiconductor industry and the fragrance and flavour industry. It is used as a dry cleaning agent. It has been used as a pesticide. Methyl isobutyl ketone is also used in uranium extraction.

In the Environment [3]

Industrial emissions of methyl isobutyl ketone can produce elevated, but still low-level concentrations in the atmosphere around the source. Because of its short life expectancy in the atmosphere methyl isobutyl ketone is expected to be confined to the local area within which it is emitted. Since it does not bind to soil well, methyl isobutyl ketone that makes its way into the ground may move through the ground and enter groundwater (bore water). Methyl isobutyl ketone quickly evaporates to a gas if released as a liquid. It dissolves when mixed with water. It evaporates from both water and soil when exposed to air. It will quickly break down in the air into acetone, formaldehyde, and 2-methylpropanal. In the soil and water bacteria will break it down. Methyl isobutyl ketone has a slight acute (short-term) toxicity on aquatic life and high toxicity to birds. It has slight chronic (long-term) toxicity to aquatic life. Chronic and acute effects on plants or land animals have not been determined. Methyl isobutyl ketone is not expected to bioaccumulate.

Sources of Emission & Routes of Exposure

Sources of Emission [3]

- Industry sources: The primary sources of methyl isobutyl ketone are the industries that manufacture it or use it in production. Some of the industries that use it in production are chemical industry, rubber manufacturers, pharmaceutical industry, the semiconductor industry, manufacturers of millwork, veneer and plywood and the manufacturers of paints, varnishes and lacquers.
- Diffuse sources: Other possible emitters of methyl isobutyl ketone are commercial and household painting and paint, varnish and lacquer removal, dry cleaners and consumer products containing methyl isobutyl ketone.

- Natural sources: Methyl isobutyl ketone is found in oranges, grapes, and in vinegar.
- Transport sources: There are no known sources of mobile emissions of methyl isobutyl ketone.
- Consumer products: Aerosol paints, architectural coatings, automobile and machinery paints and primers, household hard surface cleaners, household dyes and tints, Insecticides for yard and garden, laundry starches, lubricating greases and oils, automotive chemicals, paints, varnish and paint and varnish removers and thinners, pet flea and tick products, shoe polish, interior clear finishes, undercoats, and primers, and wood office furniture.

Routes of Exposure [4]

Occupational exposure may occur in the workplace by the inhalation of vapours and by skin and eye contact. The most probable routes of exposure to methyl isobutyl ketone by the general population are by inhalation and dermal contact during the use of consumer products that contain this compound.

Health Effects [4]

Acute Effects

- Acute exposure to methyl isobutyl ketone may irritate the eyes and mucous membranes and cause weakness, headache, nausea, light-headedness, vomiting, dizziness, incoordination, narcosis in humans.
- Acute animal tests in rats, mice, rabbits, and guinea pigs have demonstrated methyl isobutyl ketone to have low acute toxicity by inhalation or dermal exposure and moderate acute toxicity by ingestion.

Chronic Effects

- Chronic occupational exposure to methyl isobutyl ketone has been observed to cause nausea, headache, burning in the eyes, weakness, insomnia, intestinal pain, and slight enlargement of the liver in humans.
- Lethargy and increased kidney and liver weights have been observed in rats chronically exposed by gavage, ingestion, and inhalation.
- EPA has calculated a provisional Reference Concentration (RfC) of 0.08 milligrams per cubic metre for methyl isobutyl ketone based on liver and kidney effects in rats.
- EPA has calculated a provisional Reference Dose (RfD) of 0.08 milligrams per kilogram body weight per day (mg/kg/d) based on lethargy and liver and kidney effects in rats.

Reproductive/Developmental Effects

- No information is available on the reproductive or developmental effects of methyl isobutyl ketone in humans.
- Maternal toxicity and neurological effects and increased liver and kidney weights in foetuses were observed in rats and mice exposed to methyl isobutyl ketone by inhalation.

Cancer Risk

- No information is available on the carcinogenic effects of methyl isobutyl ketone in humans or animals.
- EPA has classified methyl isobutyl ketone as a Group D, not classifiable as to human carcinogenicity.

Safety [5]

First Aid Measures

- Eye Contact: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.
- Skin Contact: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.
- Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.
- Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention.
- Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.
- Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Fire Information

Methyl isobutyl ketone is flammable. The auto-Ignition temperature is 460°C (860°F), with the following flash points: closed cup: 14°C (57.2°F) and open cup: 23°C (73.4°F). Methyl isobutyl ketone is flammable in the presence of open flames and sparks. To extinguish small fires, use dry chemical powder and for large fires use alcohol foam, water spray or fog.

Exposure Control & Personal Protection

Engineering Controls

- Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value.
- Ensure that eyewash stations and safety showers are proximal to the workstation location.

Personal Protective Equipment

The following personal protective equipment is recommended when handling methyl isobutyl ketone:

- Splash goggles;
- Lab coat;
- Vapour respirator (be sure to use an approved/certified respirator or equivalent);
- Gloves.

Personal Protection in Case of a Large Spill:

- Splash goggles;

- Full suit;
- Vapour respirator;
- Boots;
- Gloves;
- A self-contained breathing apparatus should be used to avoid inhalation of the product.
- Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Regulation [3,6]

United States

Australia

Safe Work Australia has set a Time Weighted Average (TWA) concentration for methyl isobutyl ketone for workers of 50 parts per million over an eight hour workshift.

References

- http://en.wikipedia.org/wiki/Methyl_isobutyl_ketone
- http://www.environment.gov.au/archive/atmosphere/airquality/publications/sok/ketone.html
- http://www.npi.gov.au/resource/methyl-isobutyl-ketone
- http://www.epa.gov/ttn/atw/hlthef/methyl-k.html#ref4
- http://www.sciencelab.com/msds.php?msdsId=9927359
- https://www.osha.gov/dts/chemicalsampling/data/CH_245600.html

JANET'S CORNER

Who Am I?

15 May 2026

I am the pungent breath of decomposition, yet I am essential to feeding billions of people on Earth.

My Haber-Bosch synthesis revolutionized agriculture by pulling nitrogen from thin air, and I am now produced on a scale that rivals crude oil.

I am a colorless gas with a distinctive sharp odor, and I exist naturally in small amounts in the atmosphere and in all living things.

I am NH_3, three hydrogen atoms bonded to one nitrogen atom, and I'm the primary ingredient in most commercial fertilizers worldwide.