CHEMWATCH

BULLETIN

Week of 24 April 2026

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GOSSIP

China’s comprehensive new chemical safety law due to take effect

Chemistry World · 22 Apr 2026

China’s first comprehensive chemical safety management law , enacted just before the start of the year and slated to take effect on 1 May, sets detailed and legally binding requirements for managing hazardous chemicals. It shifts the national strategy surrounding chemical safety from what has been described as reactive disaster response to one of proactive risk reduction, as part of a larger effort to strengthen regulatory oversight across the country.

The new rule was adopted by the Standing Committee of China’s National People’s Congress on 27 December 2025, and it applies to entities in China that produce, store, transport and use hazardous chemicals. This includes chemical manufacturers, pharmaceutical companies and research institutions.

From the start of next month, chemical substances and mixtures in China officially listed as hazardous, or identified as hazardous, will now be required to be registered with the Chinese government. The new law defines ‘hazardous chemicals’ based on their properties and characteristics, such as toxicity, corrosiveness, explosiveness and flammability. However, some exemptions will be allowed for certain, unspecified hazardous chemicals used in scientific research and development.

The new regulatory framework also significantly strengthens corporate responsibilities, permit systems, transportation management, supervisory mechanisms, and legal liabilities surrounding the use of hazardous chemicals. Organisations and executives breaching the new regulations could be hit with penalties including suspension of operations, significant fines, or even criminal liability.

A spokesperson for ChemLinked , a Chinese-headquartered consulting firm that supports industries that handle regulated substances, tells Chemistry World that the new law ‘addresses historical issues such as management gaps in chemical industrial parks and fragmented oversight’. ‘It promotes a shift in public safety governance from reactive disaster relief to proactive prevention, aiming to resolve the root causes of industrial accidents,’ they add.

China is a major global producer and user of hazardous chemicals, and several high-profile industrial accidents have occurred in the country in recent years. Since the August 2015 Tianjin explosion , which killed over 170 people and injured nearly 800 more, several other large chemical incidents have occurred in the country . These have been attributed mostly to lack of proper safety measures in the factories and poor implementation of safety standards by the authorities.

More recently, a massive blast and fire at a chemical plant in Gaomi in May 2025 killed at least five people and injured dozens , and in January this year an industrial explosion in northern China led...

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New catalyst makes plastic upcycling 10x more efficient than platinum

Science Daily · 28 Mar 2026

Many common products, including plastics and detergents, rely on chemical reactions that depend on catalysts made from precious metals such as platinum. These metals are effective but costly and limited in supply. For years, scientists have been searching for alternatives that are cheaper and more sustainable. One promising option is tungsten carbide, an Earth-abundant material already widely used in industrial machinery, cutting tools, and chisels.

Despite its potential, tungsten carbide has not been easy to use as a catalyst. Its chemical behavior can be unpredictable, which has restricted its broader adoption. Researchers led by Marc Porosoff, an associate professor in the University of Rochester's Department of Chemical and Sustainability Engineering, have now made important progress that could allow tungsten carbide to compete with platinum in key chemical reactions.

According to Sinhara Perera, a chemical engineering PhD student in Porosoff's lab, one of the main challenges lies in how tungsten carbide atoms arrange themselves.

Tungsten carbide's atoms can form many different configurations, known as phases, says Perera. These phases can strongly influence how well the material performs as a catalyst.

"There's been no clear understanding of the surface structure of tungsten carbide because it's really difficult to measure the catalytic surface inside the chambers where these chemical reactions take place," she says.

To address this problem, the research team designed a method to precisely control the structure of tungsten carbide during active reactions. In a study published in ACS Catalysis , Porosoff, Perera, and chemical engineering undergraduate student Eva Ciuffetelli '27 manipulated tungsten carbide particles at the nanoscale inside chemical reactors that operate at temperatures above 700 degrees Celsius.

Using a technique called temperature-programmed carburization, the researchers created tungsten carbide catalysts in specific phases directly inside the reactor. They then ran chemical reactions and analyzed which versions delivered the strongest performance.

"Some of the phases are more thermodynamically stable, so that's where the catalyst inherently wants to end up," says Porosoff. "But other phases that are less thermodynamically stable are more effective as catalysts."

The team identified one phase in particular, β-W2C, that showed exceptional performance in reactions that convert carbon dioxide into key building blocks for fuels and useful chemicals. With additional optimization by industry, the researchers believe this form of tungsten carbide could match platinum's effectiveness without its high price or supply limitations.

Beyond carbon dioxide conversion, Porosoff and his collaborators have also explored tungsten carbide as a catalyst...

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Scientists produce cleaner fuel by 'catching lightning in a bottle'

New Atlas · 22 Apr 2026

People often muse over catching lightning in a bottle, and what an amazing feat it would be. But have you ever wondered what comes next if we do it? Well, researchers at Northwestern University have bottled lightning and are using it for something just as remarkable: clean fuel. Their technology uses plasma in glass tubes to produce methanol from methane gas, a process that typically requires enormous amounts of energy.

Methanol is a widely used chemical with diverse industrial and everyday applications. It's a vital ingredient for producing certain plastics and acids. It also serves as a clean-burning fuel for vehicles, marine vessels, and cooking stoves. Furthermore, it acts as an industrial solvent and is used in wastewater treatment.

For all its ubiquity, the current production method for methanol is an extremely energy-intensive, multi-step process that starts with methane gas. Steam at 800 °C (1,472 °F) separates methane into carbon dioxide (CO_2) and hydrogen (H_2). These gases are then recombined and catalyzed in a different structure under 200 to 300 times atmospheric pressure to form methanol molecules. The process works, but the energy required to generate the heat and pressure makes it far from sustainable. Then there are the multiple steps involved and the resulting CO_2.

Scientists have been on the hunt for a better alternative that is straightforward and energy-efficient, but methanol production presents yet another challenge. Apart from the extreme conditions required to break down methane, the methanol formed is extremely reactive and continues to react, rapidly degrading into CO_2. This brings us to the second challenge: getting the reaction to stop at the right moment.

To address both challenges, the researchers built a system that quite literally uses lightning in a bottle. Instead of relying on extreme heat and pressure, the researchers use short bursts of electricity to generate plasma, an energized state of matter often seen in lightning bolts, inside a water-filled reactor. Methane gas is fed through a porous glass tube coated with a copper-oxide catalyst. When high-voltage pulses are applied, the gas is briefly transformed into plasma, creating highly reactive fragments from both methane and water.

These fragments rapidly recombine to form methanol, which is immediately absorbed into the surrounding water. The rapid absorption is critical. It effectively "freezes" the reaction at the right moment, preventing the methanol from breaking down further into carbon dioxide, a key limitation of conventional processes.

To improve efficiency,...

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Scientists Decode Mysterious Magnetic “Maze Domains” To Boost EV Efficiency

Sci Tech Daily · 22 Apr 2026

A new AI-driven model exposes how complex magnetic domain patterns shape energy loss in electric motors.

The rapid rise in electric vehicle use has brought new attention to a key challenge: how efficiently electric motors convert energy. One major source of energy loss in these motors is iron loss, also called magnetic hysteresis loss. This occurs when magnetic fields repeatedly flip direction inside the motor core, which is made of soft magnetic materials.

These motors also operate under high temperatures, where heat can partially weaken magnetization and make energy losses harder to control. At the same time, the arrangement of magnetic domains (tiny magnetic regions) within these materials plays a major role in determining their behavior, including how they respond to heat and how much energy they lose.

Magnetic domains can take on a wide range of structures. In certain soft magnetic materials, they form complex zig-zag patterns known as maze domains. These patterns change in complicated ways as temperature shifts, and those changes can strongly influence energy loss.

However, studying these structures is difficult. Existing models struggle to capture the full picture because many factors are involved, including the material's internal structure, thermal effects, and overall energy stability.

To overcome these challenges, a team led by Professor Masato Kotsugi and Dr. Ken Masuzawa from the Tokyo University of Science worked with researchers from the University of Tsukuba, Okayama University, and Kyoto University. They developed a new model called the entropy-feature-eXtended Ginzburg-Landau (eX-GL) framework.

The researchers used this model to explore the energy landscape of maze domains in a rare-earth iron garnet (RIG). "Conventional simulations oversimplify real materials, while experiments reveal complexity without a clear way to quantify cause and effect," explains Prof. Kotsugi. "Our physics-based explainable artificial intelligence framework addresses these limitations and is designed to mechanistically explain temperature-dependent magnetization reversal process."

To study how magnetization changes with temperature, the team captured microscopic images of magnetic domains in the RIG sample at different temperatures. These images served as input for the eX-GL model.

The process begins with persistent homology (PH), a method that detects patterns in complex data, to identify structural variations in the domain images. Machine learning is then used to highlight the most important features in this data. This information is used to build a digital free energy landscape that tracks how domain structures evolve as energy changes.

Finally, mathematical analysis connects these microscopic patterns to large-scale...

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Now we're cooking with water! Startup offers a hydrogen-powered stove

New Atlas · 18 Apr 2026

Imagine slashing your cooking electricity bill by a factor of six. That would almost be as wild as cooking with water! Well, a green-tech startup from India called GreenVize says it has made both possible with a hydrogen-based cooking unit that runs on water and a little bit of electricity.

The system utilizes an existing technology known as Proton Exchange Membrane electrolysis to produce hydrogen from water. This technology uses electricity to split water (H_2O) into high-purity

hydrogen (H_2) and oxygen (O). A solid polymer electrolyte allows protons to pass through while separating the gases.

Hydrogen is collected and stored for various applications, while the oxygen is simply vented into the atmosphere. The startup's system makes the hydrogen immediately available as fuel, eliminating the need for storage. As the hydrogen burns, it interacts with oxygen in the air, creating harmless water vapor as a byproduct.

According to GreenVize, its plug-and-play system requires around 100 milliliters (3.38 oz) of distilled or reverse-osmosis water and approximately 1 kWh of electricity to deliver up to six hours of continuous cooking. By comparison, standard induction cookers are rated 1.5 to 2 kW. This means that for the same six hours of cooking, they consume 9-12 kWh.

"While both induction stoves and the GreenVize hydrogen cooking system use electricity, the efficiency, flexibility, and real-world usability are fundamentally different, especially for hotels, community kitchens, and high-demand cooking environments," said Sanjeev Choudhary, founder of GreenVize Energy Solutions, as reported by pv magazine .

Another beneficial feature of the system is the elimination of the requirement for storage, as it generates the hydrogen on demand. However, users also have the option of storage.

"In its standard configuration, the electrolyzer is directly coupled with the cooking unit, with hydrogen generated and consumed in real time, eliminating the need for storage. However, the system can also be configured with hydrogen storage, allowing production during off-peak hours or periods of solar generation and subsequent use during peak demand," said Sanjeev.

The product is priced at 105,000 Indian Rupees (about US$1,130) for a single-burner stove, and 150,000 Indian Rupees (US$1,610) for a double-burner stove.

So, should you rip out your induction cooking systems? After all, 1 kWh of electricity for six hours of cooking is simply a steal, plus there's "free oxygen" being released into the environment.

Well, hold your horses! It's time for some good ol' energy mathematics.

First of all,...

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What Makes Rubber So Strong? Scientists Finally Solve 100-Year-Old Mystery

Sci Tech Daily · 22 Apr 2026

A long-standing mystery in materials science has finally been resolved, revealing how microscopic particles fundamentally alter the behavior of rubber.

Every time you drive, fly on a plane, or even water your lawn, you depend on a material that has supported modern life for nearly a century: reinforced rubber. It is used in car and aircraft tires, industrial seals, medical devices, and countless everyday items. Despite its widespread use and its key role in the $260 billion global tire industry, scientists have long lacked a clear understanding of why it performs so well.

A team led by University of South Florida engineering professor David Simmons has solved a longstanding mystery in materials science: how adding tiny particles called carbon black turns soft, flexible rubber into a material strong enough to carry the weight of a fully loaded jet. The findings,

published in Proceedings of the National Academy of Sciences , provide an explanation and open the door to designing safer and more durable materials.

“How is it that we’ve been using this for 80, 90, 100 years and haven’t really known how it works?” Simmons said. “It’s been through enormous trial and error. The tire companies can purchase many different grades of carbon black – basically fancy soot – and they just have to use trial and error to figure out what’s worth paying more for and what isn’t.”

After running 1,500 molecular dynamics simulations, equivalent to about 15 years of computing time, the researchers brought together several competing theories and identified the underlying mechanism. They found that a phenomenon known as Poisson’s ratio mismatch causes rubber to resist changes in its own volume.

The formula for reinforced rubber has remained largely unchanged for decades. When microscopic particles, typically carbon black, are mixed into rubber, the material becomes much stronger and more durable. This is why tires are black and can withstand years of heat, wear, and repeated stress.

Even so, scientists have struggled to explain exactly why this happens, leading to what Simmons described as “a major debate for multiple decades now.”

Some researchers believed the particles formed chain-like structures within the rubber. Others suggested the particles acted like an adhesive, stiffening the surrounding material. Another idea was that the particles simply took up space, forcing the rubber to stretch more.

None of these explanations fully accounted for the observed behavior.

Instead of trying to directly observe these nanoscale...

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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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Contra-thermodynamic stereochemical editing explained

Chemistry World · 23 Apr 2026

While chemistry usually follows the downhill pull of thermodynamics, Alison Wendlandt is creating higher-energy stereoisomers in the final stages of synthesis

How chemists are using light, enzymes and mechanical force to access higher-energy stereoisomers without rebuilding a molecule from scratch

An organic molecule’s three-dimensional shape often dictates how chemists build it, forcing them to lock in stereochemistry at the same time as forming new bonds. But this can box chemists into using challenging, low-yielding or resource-intensive reactions.

Stereochemical editing is an alternative approach. Here, chemists make late-stage alterations to the 3D arrangement of atoms, for example, by inverting specific stereocentres. This widens the synthetic routes to a given enantiomer, rather than following a linear pathway. Such stereochemical editing can unlock previously hard-to-access stereoisomers or simplify the route to a given enantiomer.

Chiral: A molecule is said to be chiral if that molecule and its mirror image are non-superimposable.

Diastereoisomers: Stereoisomers are either enantiomers or diastereoisomers. Chiral molecules that have the relationship of mirror images are called enantiomers. All other stereoisomers are diastereoisomers including E/Z -isomers.

Enantiomer: Chiral molecules are mirror images of one another are called enantiomers. All other stereoisomers are diastereoisomers.

Epimer: Diastereoisomers that differ in only one configuration of two or more chiral elements.

Regioselective: A regioselective reaction is one in which one direction of bond making or breaking occurs preferentially over all other possible directions.

Stereocentre: Any atom in a molecule such that the interchange of two of its substituent groups leads to the formation of a different stereoisomer.

Stereoisomers: Compounds that exhibit the same constitution (the same molecular formula and connectivity of atoms) but different spatial arrangements. Stereoisomers can be further classified as enantiomers and diastereoisomers.

Stereochemistry: The study of the three-dimensional structure of molecules.

These tools can also offer a faster way to create to collections of molecules with subtle 3D differences, removing the need to synthesise each stereoisomer from scratch. Chemists can then test how these tweaks impact a molecule's properties more quickly, which may be useful in drug development, since a molecule's shape influences how well it fits into a receptor or enzyme.

Many stereochemical editing reactions will lead to a product that is more stable – or lower in energy. 'If you're breaking bonds and reforming bonds... and those are happening through microscopically identical elementary steps, then the system will necessarily descend into a thermodynamic control regime,' explains Alison Wendlandt , an...

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Atomic-level snapshots reveal how a key copper enzyme powers nature's chemistry

Phys Org · 23 Apr 2026

Researchers from the University of Liverpool, Japan, and Argentina have captured atomic-resolution images of an important copper-containing enzyme using advanced X-ray Free Electron Laser (XFEL) technology at SACLA in Japan. XFEL technology generates ultra-bright, ultra-short X-ray pulses, enabling atomic-scale imaging and real-time observation of chemical, biological, and physical processes.

The international team—led by Dr. Svetlana Antonyuk and Professor Samar Hasnain at the University of Liverpool, Professor Takehiko Tosha at the University of Hyogo, and Dr. Masaki Yamamoto at RIKEN SPring-8—studied a protein that plays a key role in the global nitrogen cycle. This protein converts nitrite, an essential nitrogen intermediate, into nitric oxide gas.

The new details reveal how an enzyme called copper nitrite reductase (CuNiR) from three different organisms converts nitrite to nitric oxide gas, using an electron and a proton—a vital process for both biology and the environment.

The results, published in Nature Communications , resolve a long-standing debate about whether the enzyme works through an ordered or random-sequential mechanism. The study shows that the reaction follows an ordered sequence, clarifying how electrons, substrate molecules, and protons are coordinated.

Beyond its biological significance, the research demonstrates how combining XFEL technology with advanced structure-refinement software (SHELXL) can resolve biomolecules at individual-atom resolution.

Dr. Svetlana Antonyuk said, "The ability of XFEL to deliver higher energy X-rays >13 keV of around ten femtosecond pulses can be successfully harnessed to provide atomic resolution structures that are free from X-ray induced redox or chemical changes in the biological system under investigation."

Professor Samar Hasnain said, "We have dedicated this paper to Professor George Sheldrick (1942–2025), whose development of the SHELXL refinement method transformed structural analysis. Our work is the first to apply this approach to atomic-resolution macromolecular structures obtained using an XFEL."

Samuel L. Rose et al, Accurate atomic resolution XFEL structures of a metalloenzyme reveal key insights into its catalytic mechanism, Nature Communications (2026). DOI: 10.1038/s41467-026-70261-1

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Efficient degradation of short-chain PFAS achieved with new method

Phys Org · 23 Apr 2026

by Helmholtz Association of German Research Centres

Short-chain perfluorinated and polyfluorinated alkyl compounds (PFAS) such as perfluorobutanoic acid (PFBA) are increasingly entering the environment via various pathways and contaminating groundwater and drinking water. Because PFAS are highly mobile, removing them has so far required a great deal of effort. But a research team at the Helmholtz Centre for Environmental Research (UFZ) has developed a new technology to do so. According to an article recently published in Chemical Engineering Journal , the new process is more environmentally friendly and less energy-intensive.

About 10,000 PFAS substances are currently known, of which 4,000–5,000 are used in industry, including in the production of outdoor clothing, food packaging, cookware, and cosmetics. Numerous PFAS—such as those found in firefighting foams—enter the environment and degrade only very slowly if at all.

Because they pose a risk to human health by affecting metabolism, hormone balance, reproduction, and the immune system and are suspected of being carcinogenic, many long-chain PFAS have been regulated under the Stockholm Convention. Their production and use are now prohibited or restricted. In response, they have been increasingly replaced with short-chain PFAS. As a result, compounds such as perfluorobutanoic acid (PFBA) are being detected more frequently in the environment. With only four carbon atoms and a carboxyl group at one end of the molecule, PFBA strongly attracts water.

"That is why PFBA dissolves readily in water and is highly mobile. It is therefore difficult to remove PFBA from water using conventional methods such as activated carbon adsorption," says Dr. Anett Georgi, UFZ chemist and co-author.

To remove PFBA from water, the UFZ research team has developed a two-stage electrochemical purification process in which PFBA is first concentrated and then broken down. How it works: In the

first step, large volumes of PFBA-containing water are passed through a flow cell with an electrode made of a textile-like activated carbon fiber felt; this electrode is given a slight positive charge for electro-adsorption.

"This causes the negatively charged PFBA to accumulate on the surface of the activated carbon," says Dr. Navid Saeidi, UFZ environmental engineer and lead author. By reversing the polarity of the voltage, the PFBA is then detached from the surface, rinsed away with a small volume of water, and collected as a concentrate. This can increase the PFBA concentration by a factor of 40. By arranging the electro-sorption cells in a cascade configuration, this enrichment...

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CURIOSITIES

Scientists discover natural hormone that reverses obesity

Science Daily · 12 Apr 2026

Scientists have discovered how a naturally occurring hormone can reverse obesity in mice, and the answer lies in the brain. Researchers at the University of Oklahoma found that the hormone works by sending signals to a brain region that helps control metabolism and appetite. This is the same general area targeted by widely used GLP-1 weight loss drugs. The findings were published in the journal Cell Reports .

The hormone, known as FGF21 (fibroblast growth factor 21), has already attracted attention as a potential target for new therapies. Drugs designed to act on this pathway are currently being tested in clinical trials for MASH (metabolic dysfunction-associated steatohepatitis), a serious form of fatty liver disease.

Lead researcher Matthew Potthoff, Ph.D., and his team focused on understanding exactly how FGF21 produces its effects. Their results show that the hormone acts through the hindbrain, which is located in the lower back part of the brain.

"In our previous studies, we found that FGF21 signals to the brain instead of the liver, but we didn't know where in the brain," said Potthoff, a professor of biochemistry and physiology in the OU College of Medicine and deputy director of OU Health Harold Hamm Diabetes Center. "We thought we would find that it signaled to the hypothalamus (which is widely implicated in body weight regulation), so we were very surprised to discover that the signal was to the hindbrain, which is where the GLP-1 analogs are believed to act."

More specifically, FGF21 interacts with two parts of the hindbrain called the nucleus of the solitary tract (NTS) and the area postrema (AP). These regions then communicate with another brain structure known as the parabrachial nucleus. This chain of signaling is essential for the hormone's ability to influence metabolism and reduce body weight.

"This brain circuit seems to be mediating the effects of FGF21," Potthoff said. "We hope that by identifying the specific circuit, it can help in the creation of more targeted therapies that are effective without negative side effects. FGF21 analogues have side effects like gastrointestinal issues and, in some cases, bone loss."

Although FGF21 and GLP-1 drugs affect similar areas of the brain, they work in very different ways. GLP-1 medications reduce appetite and food intake, while FGF21 increases metabolic activity, helping the body burn more energy and lose weight.

Potential for Future Obesity and Liver Disease Treatments

Potthoff and his team are optimistic...

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More than 20 organic compounds found on Mars – many for the first time

Chemistry World · 21 Apr 2026

An international team of researchers has identified more than 20 organic molecules in clay-bearing sandstones on Mars that are about 3.5 billion years old. The compounds discovered include benzothiophene – a known component of meteoritic macromolecular carbon that represents the largest confirmed underivatised aromatic molecule to be identified as indigenous to the Red Planet. The ester methyl benzoate was also detected, along with naphthalene , as well as single and dicyclic aromatic molecules. Finding these substances on Mars, including several widely considered building blocks for the origin of life on Earth, suggests that prebiotic chemistry could have existed there once.

Nasa's Curiosity Mars rover took this selfie at a location named Mary Anning after the 19th century British palaeontologist. This was the site of the chemical experiment uncovering diverse organic molecules on Mars, which scientists believe was a site where ancient conditions would have been favorable to supporting life, if it was ever present

The Curiosity rover detected aromatic and cyclic molecules with methyl and ester/carboxylic acid functional groups, and sulfur-, oxygen-, and nitrogen-bearing organics, including the first discovery of a possible N -heterocycle on Mars. The rover identified these organic molecules using its suite of on-board instruments.

Of the more than 20 molecules detected, the team was able to confirm the identity of seven, most of which had never been detected on Mars previously. Team leader Amy Williams , a geobiologist and organic geochemist at the University of Florida, says that a nitrogen heterocycle Curiosity found is 'really intriguing' because of its apparent similarity to a molecule considered a precursor for RNA and DNA. Spectra from Curiosity are consistent with dimethylindole .

The sample locations where Curiosity took three samples of drilled rock on its way out of the Glen Torridon region. Analysing these samples revealed diverse organic molecules on Mars

These complex chemicals could have been generated geologically or biologically on Mars, or they could have been formed on meteorites and been delivered to the planet, Williams explains. 'The story our findings tell is that there is complex organic carbon preserved in the very near subsurface of Mars, where we thought radiation would have destroyed all of that,' she says. 'The organics that rained down on Mars might have been present very early on in Mars's history, even at the time when life was originating on Earth.'

Janice Bishop , a chemist and planetary scientist with the SETI...

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Giant octopuses may have ruled the oceans 100 million years ago

Phys Org · 23 Apr 2026

Today's octopuses are intelligent, remarkably flexible animals that lurk in reefs, hide in crevices, or drift through the deep sea. But new research suggests that their earliest relatives may have played a

far more predatory role in ocean ecosystems. A study led by researchers at Hokkaido University has found that the earliest known octopuses were giant predators that hunted at the very top of the food web, alongside large marine vertebrates. The study is published in Science .

Octopuses are soft-bodied animals, and they rarely fossilize well. This makes their evolutionary history especially difficult to trace compared with animals that leave behind bones or shells. In this study, the researchers used fossil jaws of early octopuses, a feeding organ with a high fossilization potential, to reconstruct their hidden history.

Using high-resolution grinding tomography and an artificial intelligence model, they found fossil jaws hidden inside rock samples from the Late Cretaceous period, spanning 100 million to 72 million years ago. These fossils, found in Japan and Vancouver Island, had been well preserved in calm seafloor sediments, retaining fine wear marks that revealed how these animals fed.

The fossils belonged to a group of extinct finned octopuses, known as Cirrata. By analyzing the size, shape, and wear patterns of the jaws, the team concluded that these animals were active predators that likely crushed hard prey with powerful bites.

"Our findings suggest that the earliest octopuses were gigantic predators that occupied the top of the marine food chain in the Cretaceous," says Professor Yasuhiro Iba of Hokkaido University. "Based on exceptionally well-preserved fossil jaws, we show that these animals reached total lengths of up to nearly 20 meters, which may have surpassed the size of large marine reptiles of the same age."

"The most surprising finding, perhaps, was the extent of wear on the jaws ," says Iba. The fossil jaws showed extensive chipping, scratching, cracking, and polishing, all signs of a strong biting force. "In well-grown specimens, up to 10% of the jaw tip relative to the total jaw length had been worn away, which is larger than that seen in modern cephalopods that feed on hard-shelled prey. This indicates repeated, forceful interactions with their prey, revealing an unexpectedly aggressive feeding strategy."

These findings suggest that these ancient octopuses were powerful and active hunters that consumed abundant prey.

The discovery changes what scientists thought about the early history of octopuses. The new...

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Inside the skull of a Devonian fish from Gondwana, revealed by neutron imaging

Phys Org · 23 Apr 2026

Flinders University researchers have taken a revealing look inside the head of one of the first animals to crawl from the water to live on land more than 380 million years ago. Using high-tech neutron imaging, they scanned the skull and braincase of the only known specimen of Koharalepis jarviki, a large fossil fish found in freshwater rivers in the vast Lashly Mountains region of Antarctica which lived during the Devonian Period or "Age of Fishes."

"This precious fossil belongs to a group called the Canowindridae which highlights the ancient links between Australia and Antarctica," says Flinders University Research Fellow Dr. Alice Clement, co-author of a new article published in Frontiers in Ecology and Evolution .

"It is important to study such specimens from the Devonian Age of Fishes when the waters teemed with predatory lobe-finned fish like this that are closely related to land animals (tetrapods)," says Dr. Clement, from the College of Science and Engineering.

Koharalepis is a member of the Canowindridae family, a group that lived in East Gondwana, whose fossils have been found across Australia and Antarctica. It is an ancestor of the first land animals or four-limbed vertebrate tetrapods.

Lead author of the new study, Corinne Mensforth, a Ph.D. candidate from the Flinders Paleontology Lab, says, "We chose to focus on Koharalepis as it is the only fossil in the entire family to preserve the internal bones of the skull, which gives us valuable insights into its braincase and neuroanatomy.

"We found evidence that the brain of Koharalepis was similar to those of the fishes that straddle the vertebrate water-to-land transition. We also found adaptations to life near the surface of the water, including openings in the top of the skull for additional air intake and an organ within the brain that detects light and circadian rhythms.

"Koharalepis, which grew to about 1 meter, was an ambush predator that preyed on other smaller animals in their environment, and with relatively small eyes it must have relied heavily on its other senses to capture its prey."

Another co-author of the latest study, Flinders University Emeritus Professor John Long, was part of earlier research describing Koharalepis in 1991–92. Professor Long says the new data generated by modern non-destructive imaging techniques describe the internal skeleton of the skull, shoulder girdle, and part of the backbone.

"This has enabled us to understand some of the behavior, adaptations, and relationships...

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Scientists thought this was a young T. rex. They were wrong

Science Daily · 23 Dec 2026

A long-running scientific debate may finally be nearing its end. New research involving the University of Nebraska State Museum's Ashley Poust provides strong evidence that Nanotyrannus , often described as a smaller version of Tyrannosaurus rex , was in fact a real and separate species.

The research team, led by Christopher Griffin of Princeton University, focused on the original Nanotyrannus fossil, a skull housed at the Cleveland Museum of Natural History. To determine the animal's age at death, they examined a rarely studied bone known as the ceratobranchial, or hyoid, which was preserved with the skull.

Using bone histology, or the study of fossilized bone microstructure, the team analyzed this small throat bone and identified growth patterns that indicate the animal had reached or was close to full maturity. This finding is critical because it shows the specimen was not a young Tyrannosaurus rex still growing.

These findings were published in Science .

"This small-bodied -- in relation to the T. rex -- meat-eater's hyoid bone showed growth patterns that suggest maturity or approaching maturity," said Poust, Voorhies Endowed Curator of Vertebrate

Paleontology. "This lets us be confident in keeping the name Nanotyrannus, because this animal is clearly not on a growth path to becoming a Tyrannosaurus rex ."

Estimates suggest Nanotyrannus reached about 18 feet in length, making it significantly smaller than a full-grown T. rex , which could exceed 40 feet. This size difference supports the idea that it was not simply a younger stage of the larger species.

The Nanotyrannus skull was first discovered in 1942 and initially classified as Gorgosaurus. In 1988, further study led scientists to rename it Nanotyrannus lancensis . However, many researchers later argued that it was actually a juvenile T. rex , fueling decades of debate.

The new findings challenge that long-standing assumption.

"At the time, the prevailing consensus was that the Nanotyrannus holotype skull represented an immature Tyrannosaurus rex , and was not a separate species," said Griffin, assistant professor of geosciences at Princeton. "Our expectations were simply following along with that consensus, but once we sampled the hyoid and saw features that strongly indicated maturity, we knew that we had to examine that idea more skeptically."

A New Method for Studying Dinosaur Growth

To strengthen their conclusions, Poust compared hyoid bones from a range of species, including modern relatives of dinosaurs (ostriches, alligators and lizards), as well as other fossil...

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This Student Recreated the Universe in a Bottle. What She Discovered Could Help Reveal How Life Started on Earth

Sci Tech Daily · 22 Apr 2026

A study reconstructs the chemical composition of key molecules in stars by analyzing their infrared fingerprints.

A PhD student has recreated a small portion of the Universe inside a laboratory setup, producing synthetic cosmic dust and offering new insight into how the chemical ingredients for life may have formed long before Earth existed.

Linda Losurdo, a PhD candidate in materials and plasma physics at the University of Sydney ’s School of Physics , conducted the experiment using a simple blend of gases—nitrogen, carbon dioxide, and acetylene. The setup was designed to replicate the extreme and highly dynamic conditions found around stars and within supernova remnants.

When exposed to strong electrical energy, the gas mixture produced carbon-rich particles that resemble cosmic dust found drifting through interstellar space and within comets, asteroids, and meteorites.

The findings have been published in The Astrophysical Journal of the American Astronomical Society.

The lab-created material contains a complex combination of carbon, hydrogen, oxygen, and nitrogen, commonly referred to as CHON molecules. These elements form the basis of many organic compounds that are essential for life.

"We no longer have to wait for an asteroid or comet to come to Earth to understand their histories," Ms Losurdo said. "You can build analog environments in the laboratory and reverse engineer their structure using the infrared fingerprints.

"This can give us huge insight into how 'carbonaceous cosmic dust' can form in the plasma puffed out by giant, old stars or in cosmic nurseries where stars are being born and distribute these fascinating molecules that could be vital for life.

"It's like we have recreated a little bit of the Universe in a bottle in our lab."

Cosmic dust forms in highly energetic regions of space, where molecules are continuously struck by charged particles such as ions and electrons. Scientists detect this material by measuring its infrared emission, which acts as a molecular fingerprint revealing its composition.

The dust produced in the laboratory displayed the same distinctive infrared patterns, showing that the experiment closely reproduces the processes that occur in space.

One of the major questions in science is how life first began on Earth. Researchers continue to explore whether early organic molecules formed on the planet itself, arrived later via comets and meteorites, or were delivered during the earliest stages of solar system formation, or some combination of these possibilities.

Between about 3.5 and 4.56 billion years ago, Earth...

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Hidden virus in your gut may be linked to colon cancer

Science Daily · 25 Jan 2026

Colorectal cancer is among the most common cancers in Western countries and remains a major cause of cancer-related deaths. While factors like age, diet, and lifestyle are known to influence risk, the exact triggers behind the disease are still not fully understood.

In recent years, scientists have increasingly focused on the gut microbiome, the vast ecosystem of bacteria, viruses, and other microorganisms living in the digestive system.

Now, researchers from the University of Southern Denmark and Odense University Hospital have identified a previously unknown virus inside a common gut bacterium. This virus appears more often in people with colorectal cancer, offering a new clue about how the disease may develop.

A Common Gut Bacterium With a Longstanding Mystery

For years, researchers have linked one specific bacterium, Bacteroides fragilis , to colorectal cancer. However, this connection has been difficult to explain because the same bacterium is also found in most healthy individuals.

"It has been a paradox that we repeatedly find the same bacterium in connection with colorectal cancer, while at the same time it is a completely normal part of the gut in healthy people," says Flemming Damgaard, medical doctor and PhD at the Department of Clinical Microbiology at Odense University Hospital and the University of Southern Denmark.

To resolve this contradiction, the team investigated whether there might be important differences within the bacterium itself.

The key difference turned out to be a virus living inside the bacterium. In patients who later developed colorectal cancer, Bacteroides fragilis was much more likely to carry a specific bacteriophage, a virus that infects bacteria.

"We have discovered a virus that has not previously been described and which appears to be closely linked to the bacteria we find in patients with colorectal cancer," says Flemming Damgaard.

The researchers believe this virus represents entirely new types that have not been identified before.

"It is not just the bacterium itself that seems interesting. It is the bacterium in interaction with the virus it carries," he explains.

Although the study shows a strong statistical link between the virus and colorectal cancer, it does not prove that the virus causes the disease.

"We do not yet know whether the virus is a contributing cause, or whether it is simply a sign that something else in the gut has changed," says Flemming Damgaard.

The discovery began with data from a large Danish population study involving about two million people....

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Scientists Create “Neurobots” – Living Machines With Their Own Nervous Systems

Sci Tech Daily · 23 Apr 2026

Neurobots—xenobots with neurons—show self-organized nervous systems and enhanced behaviors, revealing new insights into how biology builds functional structures.

In 2020, researchers at Tufts University developed tiny living structures known as xenobots using frog cells. These microscopic organisms could move through water, repair themselves, and even gather loose cells to form new xenobots.

Scientists at Tufts and the Wyss Institute have now pushed this work further by introducing nerve cells into these biological machines. The upgraded versions, called neurobots, can take on different shapes and display new patterns of movement. The findings were recently published in Advanced Science .

Led by Michael Levin, Vannevar Bush Professor of Biology, and Haleh Fotowat of the Wyss Institute, the research is part of a broader effort to understand how groups of cells organize themselves into complex structures under unfamiliar conditions. This knowledge could support advances in synthetic biology and regenerative medicine. Studying neurobots may reveal the underlying rules that guide how nervous systems form, which could eventually help scientists design new biological structures or repair damaged tissues.

The team began with cells taken from early embryos of the African clawed frog, Xenopus laevis . When precursor skin cells from these embryos are isolated and placed in a dish, they naturally assemble into small, round structures covered in tiny hair-like projections called cilia.

The coordinated motion of these cilia allows xenobots, a type of biobot, to swim through water. They are entirely biological and are created without scaffolds or genetic modification. These organisms

can heal themselves and survive for about 9 to 10 days using nutrients stored in the original embryonic cells. Researchers had already studied their structure and behavior and wanted to see how adding neurons would change them, especially since these systems have no evolutionary history shaping their neural organization.

To produce neurobots, scientists inserted clusters of neural precursor cells, which later develop into neurons, into the center of forming biobots. This was done during a brief stage when the spherical structures were still developing. The implanted cells matured and extended branching structures known as axons and dendrites throughout the interior and toward the surface.

“We wanted to find out what would happen if we provided these biobots with the raw materials needed to build a nervous system,” said Levin, director of the Allen Discovery Center at Tufts. He explained that neurobots offer a new way to study how neurons organize themselves and...

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Three chemistry Nobel laureates shared their failures – and how they overcame them

Chemistry World · 17 Apr 2026

At the recent spring meeting of the American Chemical Society (ACS) three Nobel laureates met at a roundtable and shared their stories about the obstacles they overcame to become scientific superstars. Participating were biochemist Jennifer Doudna, who won the award in 2020 for developing Crispr–Cas9 genome editing ; organocatalysis pioneer David MacMillan , who shared the prize in 2021 for discovering asymmetric organocatalysis; and Omar Yaghi , who is known as the father of reticular chemistry and won last year’s award for co-developing metal–organic frameworks (MOFs) .

Yaghi told a story about being asked to perform what should have been a simple de-coordination reaction in graduate school but one that took him about a year of failures before succeeding. And during this time, even though he loved chemistry and couldn’t imagine his future without it, Yaghi said be doubted whether it was the right path for him. ‘I questioned whether passion was sufficient,’ Yaghi recounted.

Reticular chemistry pioneer Omar Yaghi said that with perserverence success can often be just around the corner

At the end of that year he succeeded, but the material decomposed as he took it to the lab’s nuclear magnetic resonance instrument. ‘This beautiful orange solid turned into a brown gunk, and I asked one of the postdocs, “What do I do with this?” And this postdoc said, “Throw it away, it’s ugly”. And I didn’t because that was my whole year of work,’ Yaghi recalled. After working up the reaction it crystalised the next day. ‘That was the beauty I was expecting,’ he told the audience. ‘So, I would say that if you feel things are desperate, success may very well be right around the corner.’

Doudna talked about taking chemistry at Pomona College in California, having come out of a public high school in Hawaii where no advanced chemistry courses were offered. She suddenly found herself in a class with lots of students who had taken such courses and earned college credits for chemistry before graduating high school. ‘I was really underwater compared to a lot of my classmates and I struggled, and I asked myself whether I was cut out to be a chemist,’ Doudna stated. She recalled her parents urging her to give it another semester before abandoning chemistry.

So Doudna took organic chemistry and absolutely loved it. ‘It felt like solving puzzles,’ she said. ‘The challenge was: how do I build this...

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Scientists just solved a 160-million-year fossil mystery “I’ve never seen anything like it”

Science Daily · 28 Feb 2026

At first glance, sea sponges seem almost too simple to be mysterious.

They have no brain and no gut, and scientists have long believed they originated around 700 million years ago. Yet clear fossil evidence only dates back to about 540 million years ago, leaving a puzzling 160 million-year gap in the record.

In a study published in the journal Nature , Virginia Tech geobiologist Shuhai Xiao and his collaborators describe a 550 million-year-old sea sponge fossil that falls squarely within this missing interval. The team also proposes a key explanation for the gap: the earliest sponges may not have had mineral skeletons, making them far less likely to fossilize.

This idea helps resolve a long-standing paradox in evolutionary science.

Scientists have used molecular clock estimates, which track the accumulation of genetic mutations over time, to suggest that sponges first evolved around 700 million years ago. However, rocks from that era have not yielded convincing sponge fossils.

This disconnect has fueled years of debate among zoologists and paleontologists.

The new discovery helps bridge that divide. It adds an important piece to the evolutionary history of one of Earth's earliest animals and offers an explanation for why older fossils have been so difficult to find. It also connects back to questions first raised by Darwin about when early animal life emerged.

A Surprising Discovery Along the Yangtze River

Xiao first encountered the fossil about five years ago when a collaborator sent him a photo of a specimen uncovered along the Yangtze River in China.

"I had never seen anything like it before," said Xiao, a faculty member in the College of Science. "Almost immediately, I realized that it was something new."

Working with researchers from the University of Cambridge and the Nanjing Institute of Geology and Paleontology, Xiao began testing different possibilities. The fossil did not match known features of sea squirts, sea anemones, or corals. That left one intriguing possibility: an ancient sea sponge.

In earlier work published in 2019, Xiao and his team suggested that the first sponges may not have produced the hard, needle-like structures called spicules that define modern sponges.

By examining the fossil record, the researchers found that sponge spicules become more mineralized over time. The further back they looked, the more organic and less mineral-based these structures appeared.

"If you extrapolate back, then perhaps the first ones were soft-bodied creatures with entirely organic skeletons and...

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REACH UPDATE

Restriction

ECHA · 15 Apr 2026

Intentions and Annex XV restriction proposals received by ECHA

The table below includes the list of substances or group of substances for which an intention to submit a restriction proposal under REACH has been notified to ECHA. A restriction proposal may be prepared by a Member State, or by ECHA at the request of the Commission. It can also be developed by ECHA on its own initiative for substances in the Authorisation List (Annex XIV). It is a legal requirement to notify the intentions to prepare a restriction dossier within 12 months of its submission. Stakeholders are encouraged to submit any relevant information to the dossier submitters during the preparation of the restriction proposal. Additionally, stakeholders can provide comments during the two consultations foreseen in the restriction process. Interested parties can follow the progress of a proposal through the restriction process, from the notification of the intention to the adoption of the final opinions by the Committee for Risk Assessment (RAC) and the Committee for Socio-economic Analysis (SEAC), and the adoption of the restriction by the European Commission.

Activity details

Substance name

Certain phenyl-p-phenylenediamines (PPDs) and other para-substituted phenylenediamines (PDs)

Certain phenyl-p-phenylenediamines (PPDs) and para-substituted phenylenediamines (PDs)

Details on the scope of restriction

Restricting the manufacturing of 6PPD and related compounds in rubber tires and potentially other rubber goods. Expected submission: end 2026.

Restricting the placing on the market of 6PPD and related compounds in rubber tyres and potentially other rubber goods. Not necessarily all substances in the group of “phenyl-p-phenylenediamines (PPDs) and para-substituted phenylenediamines (PDs)” will be proposed for restriction.

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REGULATORY UPDATE

ASIA PACIFIC

B50 trials in mining sector show positive results ahead of rollout

Petromindo · 8 Apr 2026

The Ministry of Energy and Mineral Resources (ESDM) reported positive results from trials of 50% biodiesel (B50) in mining heavy equipment, reinforcing the government's plan to roll out the mandate nationwide from July 1.

The B50 program is part of Indonesia's broader strategy to reduce reliance on fossil fuels, curb fuel imports and strengthen energy security amid rising global oil prices.

Director General of New, Renewable Energy and Energy Conservation (EBTKE) Eniya Listiani Dewi said interim trial results show stable engine performance with no significant technical issues.

"Overall, B50 usage in diesel engines in the mining sector shows stable performance with no major engine problems. This indicates biodiesel can reliably support industrial operations," she said in a statement.

The trials, covering fuel quality, engine performance, durability and storage stability, have recorded more than 900 operational hours without fuel-related issues as of end-March 2026.

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South Korea and Indonesia discuss energy security, sign agreements on minerals and tech

Reuters · 1 Apr 2026

South Korean President Lee Jae Myung held talks on Wednesday with Indonesian leader Prabowo Subianto, discussing energy security and agreeing to expand cooperation in areas such as defence, Lee's office said.

The summit talks followed a welcome ceremony at the presidential Blue House in Seoul.

"We view Indonesia's stable role in supplying key energy resources such as LNG and coal as very reassuring," Lee said in a statement, calling for closer cooperation on energy supply and resource security amid the global uncertainty triggered by the conflict in the Middle East.

In a joint statement, South Korea and Indonesia pledged to accelerate the launch of high-level energy security dialogue and public-private cooperation channels, emphasising the need to keep global energy supply chains stable and minimise disruptions to the flow of energy and essential goods.

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AMERICA

Danger to human health or safety assessment for free-standing clothing storage units

Government of Canada · 31 Mar 2026

Table 3 was first published in July 2020 to consolidate information for regulated parties in an effort to increase openness and transparency regarding Health Canada's evaluation of products that pose a danger to human health or safety. The original entry for free-standing clothing storage units was added to Table 3 upon initial posting of the table in July 2020, after the danger to human health or safety was communicated by Health Canada to regulated parties. This assessment now reflects the updated applicable criteria of the referenced consensus-based safety standard.

Health Canada has determined that the 2023 edition of ASTM F2057 provides an important increase in protection against tip-over for Canadian children over a much wider age group, when compared to the 2019 edition. For this reason, Health Canada finds the 2023 edition of the standard to be substantially improved, and the 2019 edition may no longer be sufficiently protective of health and safety. Therefore, it is recommended that the General Prohibition Table 3 entry for free-standing clothing storage units be updated to reflect the latest version of ASTM F2057.

Legislative background

The purpose of Canada Consumer Product Safety Act (CCPSA) is to protect the public by addressing or preventing dangers to human health or safety that are posed by consumer products in Canada, including those that circulate within Canada and those that are imported. Any person who manufactures, imports, advertises, sells or tests a consumer product must comply with all applicable requirements of the CCPSA and its regulations. Paragraphs 7(a) and 8(a) of the CCPSA prohibit the manufacture, importation, advertisement or sale of any consumer product that is a "danger to human health or safety". The CCPSA defines the term as follows:

Danger to human health or safety means any unreasonable hazard — existing or potential — that is posed by a consumer product during or as a result of its normal or foreseeable use and that may reasonably be expected to cause the death of an individual exposed to it or have an adverse effect on that individual's health — including an injury — whether or not the death or adverse effect occurs immediately after the exposure to the hazard, and includes any exposure to a consumer product that may reasonably be expected to have a chronic adverse effect on human health.

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Notification of Cosmetics: Guide for Cosmetic Notifications

Government of Canada · 2 Apr 2026

Guide for Cosmetic Notifications

This document provides guidance to help you to fill in the online Cosmetic Notification form.

It contains information on some requirements of Food and Drugs Act (FDA) and the Cosmetic Regulations (CR).

It is not intended to substitute for or limit the requirements under the FDA or the CR. In case of any difference between this document and the legislation, the legislation will prevail.

According to section 30 of the CR, manufacturers and importers must notify Health Canada within 10 days after they first sell a cosmetic in Canada.

Failure to notify may result in a product being denied entry into Canada or removed from sale under subsection 15.3(1), which prohibits the sale of a cosmetic if a notification has not been received. Furthermore, section 15.3 of the CR prohibits the sale of a cosmetic :

when a revised notification has not been received within 10 days after it becomes inaccurate, or

if requested information regarding a notification was not provided to Health Canada within 10 days.

To notify a new cosmetic, amend an existing notification, or discontinue the sale of a cosmetic, fill out and submit a Cosmetic Notification Form (CNF) to Health Canada.

Who this guide is for

This guide is intended for any person who is required to notify Health Canada about a cosmetic that they manufacture, import or sell in Canada. This includes:

- A Canadian manufacturer of a cosmetic
- A Canadian importer of a cosmetic; or

The person filling out the notification on behalf of a manufacturer or importer.

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Reporting PFAS in products

Minnesota Pollution Control Agency · 17 Apr 2026

As part of the PFAS pollution prevention law called Amara's Law, manufacturers are required to report intentionally added PFAS in products sold in Minnesota and pay a fee. Initial reports are due by September 15, 2026. Subsequent reports are due each year on February 1. All information except trade secrets will be publicly accessible after a review period.

Resources for product manufacturers

Reporting requirement

A manufacturer or group of manufacturers of a product sold, offered for sale, or distributed in the state must submit a report that includes information about each product or component that contains intentionally added PFAS. This includes products only sold online. Manufacturers have been able to prepare for PFAS reporting since Amara's Law was enacted in May 2023. Minn. Stat. § 116.943, subd. 2 requires reporting a description of the product, the purposes/functions that PFAS play in the product, the amount of each type of PFAS, and other information.

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EPA Launches PFAS Out Initiative to Help Proactively Address PFAS in Drinking Water

US EPA · 14 Apr 2026

Today, U.S. Environmental Protection Agency (EPA) Assistant Administrator for Water Jess Kramer launched a new initiative called PFAS OUTreach—or PFAS OUT. This new effort proactively works with communities and water systems to reduce exposure to PFOA and PFOS in drinking water, years ahead of compliance with federal regulatory requirements. The initiative is central to EPA's commitment to protecting Americans from PFAS contamination and advancing President Trump's Make America Healthy Again agenda.

"Protecting Americans from exposure to PFAS in drinking water is a priority for EPA. That's why I'm thrilled to launch the PFAS OUT initiative to help water systems accelerate actions to reduce exposure to PFOA and PFOS," said EPA Assistant Administrator for Water Jess Kramer. "These contaminants are well studied, their health impacts are well understood. Through PFAS OUT, EPA will help protect public health by—for the very first time—proactively engaging with water systems, states, and other partners to address drinking water contamination."

PFAS OUT is a proactive outreach initiative to provide information on resources, including funding and technical assistance, to drinking water systems with PFAS challenges. This outreach will provide practical, interactive location-specific resources, including webinars and information, on how to access funding and technical assistance to address PFAS

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EUROPE

From Data to Green: The Path Towards Environmentally Conscious Medical Devices

RIVM · 10 Apr 2026

This report, produced by RIVM for the Ministry of Health, Welfare and Sport (VWS), serves as a practical resource for policymakers, standards developers, and stakeholders, helping them set up and interpret life cycle analyses (LCA) for medical devices. It offers insight into which environmental indicators, data, and methods are needed to evaluate environmental impact. The report introduces a categorization based on life cycle characteristics and recommends twelve core indicators, transparent data, and harmonized analysis methods to reliably map sustainability. Furthermore, RIVM encourages international collaboration and harmonization to enhance the quality and comparability of environmental impact assessments.

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On the risk of reversal of carbon farming projects

European Commission · 9 Apr 2026

The Carbon Removals and Carbon Farming (CRCF) regulation (EU-2024/3012) aims at developing a voluntary carbon (C) market for the EU, generating a new 'green busi-ness model'.

Carbon farming activities' can contribute to land resilience and climate change mitiga-tion potential.

The contribution to climate mitigation de-pends on the ability to ensure the perma-nence and integrity of the carbon credits

The concept of a buffer pool, a reserve of carbon credits set aside to account for po-tential risks of project failure, has been in-troduced in the CRCF.

We provide practical recommendations for the development of a science-based risk assessment and buffer pool quantification.

We provide a pan European estimate of the buffer pool for agricultural and soil organic carbon removals and afforestation

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Commission evaluation of the EU tobacco control framework highlights progress and emerging public health challenges

European Commission · 2 Apr 2026

The European Commission has today published its evaluation of the EU tobacco control framework. It assesses the effectiveness, efficiency and relevance of the Tobacco Products Directive and Tobacco Advertising Directive in protecting public health and ensuring the smooth functioning of the internal market.

The findings show that the EU rules on tobacco control have contributed to a significant decline in smoking and tobacco-related deaths across the EU. At the same time, the evaluation highlights growing challenges linked to the rapid emergence of novel tobacco and nicotine products, particularly among young people.

Since 2012, smoking rates in the EU have fallen from 28% to 24% of the population, with an even sharper decline among young people. Tobacco-related deaths have also decreased substantially, reflecting the positive impact of stricter rules on product regulation, advertising bans and health warnings.

The evaluation also confirms that harmonised EU rules have improved the functioning of the internal market. Measures such as regulation and reporting of ingredients, labelling and packaging requirements, the traceability and security features of tobacco products, and cross border advertising and sponsorship rules, have contributed significantly to the smooth functioning of the internal market and enhanced the effectiveness of the tobacco control framework.

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INTERNATIONAL

UNEP OzonAction and China to Hold Major 2026 Ozone2Climate Forum in Beijing

UNEP · 7 Apr 2026

The United Nations Environment Programme (UNEP) OzonAction, in close cooperation with the Government of China and the China Refrigeration and Air-Conditioning Industry Association (CRAA),

will hold the 2026 Ozone2Climate (O2C) Technology Roadshow and Industry Roundtable from 8–10 April 2026 at the Capital International Exhibition & Convention Centre in Beijing.

Marking its 15th edition, the O2C Forum has grown into one of the leading global platforms for advancing ozone and climate friendly technologies in the refrigeration and air conditioning (R&AC) sector. Since 2012, UNEP, FECO/MEE, and CRAA have jointly organized this event in China, supporting national commitments under the Montreal Protocol and the Kigali Amendment to phase out HCFCs and transition to lower GWP alternatives.

This year's programme brings together an exceptional lineup of international, regional, and national speakers, including policymakers, industry experts, and technology innovators. Discussions will cover global policy developments, natural refrigerant applications, cold chain innovation, heat pump efficiency enhancements, and best practices in refrigerant management and servicing.

Taking place alongside the CRH 2026 Exhibition, one of the largest HVAC&R expos globally, the event will feature a comprehensive Technology Roadshow presenting cutting edge, ozone and climate friendly equipment and solutions. Exhibits will include zero ODP and lower GWP technologies, next generation refrigeration systems, high efficiency compressors, and energy efficient innovations.

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HAZARD ALERT

n-Hexane

24 Apr 2026

Hexane is an alkane of six carbon atoms, with the chemical formula C6H14. There are 5 hexane isomers; n-hexane is the unbranched isomer. [1] n-Hexane is a chemical made from crude oil. Pure n-hexane is a colourless liquid with a slightly disagreeable odour. It evaporates very easily into the air and dissolves only slightly in water. n-Hexane is highly flammable, and its vapours can be explosive. [2]

Uses [3]

It is used in laboratories, primarily when it is mixed with similar chemicals to produce solvents. Common names for these solvents are commercial hexane, mixed hexanes, petroleum ether, and petroleum naphtha. The major use for solvents containing n-hexane is to extract vegetable oils from crops such as soybeans, flax, peanuts, and safflower seed. They are also used as cleaning agents in the textile, furniture, shoemaking, and printing industries, particularly rotogravure printing. N-hexane is also an ingredient of special glues that are used in the roofing, shoe, and leather industries. n-Hexane is used in binding books, working leather, shaping pills and tablets, canning, manufacturing tires, and making baseballs.

Sources of Emission & Routes of Exposure

Sources of Emission [3]

- Industry sources: Releases from industries producing, using or handling hexane. For example, rubber and plastics products industries, oil refineries, chemical plants, footwear manufacturing, petrol, and paints and adhesives.
- Diffuse sources: Releases from service stations; evaporation of fuels during petrol refilling; underground storage tanks that leak. Releases during use of adhesives, paints, and paint thinners.
- Natural sources: Hexane is a natural constituent of crude petroleum. It also occurs naturally as a plant volatile and can be released from volcanoes. Furthermore, n-hexane occurs naturally in, forest fires, and some plants.
- Transport sources: Vehicle exhaust. Evaporation of vehicle fuels from motors and vehicle fuel tanks.
- Consumer products: Consumer products that contain small amounts of n-hexane include petrol, rubber cement, type-over correction fluids, non-mercury (low temperature) thermometers, alcohol preparations, and aerosols in perfumes. n-Hexane is also a component of preparations such as paint thinners, general-purpose solvents, degreasing agents, and cleaners.

Routes of Exposure [3,4]

n-Hexane evaporates very quickly and so the most common exposure is from breathing air-containing hexane. It can also enter via the skin. The most probable route of human exposure to hexane is by inhalation. Since it is in gasoline, nearly everyone is exposed to very small amounts of n-hexane in the air. Exposure can occur at home if you use products containing n-hexane without proper ventilation. Individuals are most likely to be exposed to hexane in the workplace. Monitoring data indicate that hexane is a widely occurring atmospheric pollutant.

Health Effects

Acute Effects

- Acute inhalation exposure of humans to high levels of hexane causes mild CNS depression. CNS effects include dizziness, giddiness, slight nausea, and headache in humans.
- Acute exposure to hexane vapours may cause dermatitis and irritation of the eyes and throat in humans.
- Acute animal tests in rats have demonstrated hexane to have low acute toxicity from inhalation and ingestion exposure.

Chronic Effects

- Chronic inhalation exposure to hexane is associated with sensorimotor polyneuropathy in humans, with numbness in the extremities, muscular weakness, blurred vision, headache, and fatigue observed.
- Rats, chronically exposed by inhalation, have exhibited neurotoxic effects.
- Mild inflammatory, erosive, and degenerative lesions in the olfactory and respiratory epithelium of the nasal cavity have been observed in mice chronically exposed by inhalation. Pulmonary lesions have also been observed in chronically exposed rabbits.
- The Reference Concentration (RfC) for hexane is 0.2 milligrams per cubic metre (mg/m3) based on neurotoxicity in humans and epithelial lesions in the nasal cavity in mice.
- EPA has not established a Reference Dose (RfD) for hexane.
- EPA has calculated a provisional RfD of 0.06 milligrams per kilogram body weight per day (mg/kg/d) based on neurological and reproductive effects in rats.

Reproductive/Developmental Effects

- No information is available on the reproductive or developmental effects of hexane in humans.
- Testicular damage has been observed in male rats exposed to hexane via inhalation.
- Teratogenic effects were not observed in the offspring of rats chronically exposed via inhalation in several studies.

Cancer Risk

- No information is available on the carcinogenic effects of hexane in humans or animals.
- EPA has classified hexane as a Group D, not classifiable as to human carcinogenicity, based on a lack of data concerning carcinogenicity in humans and animals. (3,5)

Safety [6]

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. Get medical attention if irritation occurs.
- Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.
- Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.
- Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.
- 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 unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Fire and Explosion Information

- n-Hexane is flammable.
- Auto-ignition temperature is 225°C (437°F)
- Flash Points: CLOSED CUP: -22.5°C (-8.5°F).
- Carbon monoxide (CO) and carbon dioxide (CO2) are produced upon combustion.
- Highly flammable in presence of open flames and sparks, of heat.
- Non-flammable in presence of shocks.
- n-hexane is a flammable liquid that is insoluble in water.
- Dry chemical powder should be used to extinguish small fires
- Water spray or fog should be used to extinguish large fires.
- Special Remarks on Fire Hazards: Extremely flammable liquid and vapour. Vapour may cause flash fire.

Exposure Controls & 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 n-hexane:

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

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

United States [4,7]

NIOSH: The National Institute of Occupational Safety and Health has established a Recommended Exposure Limit (REL) of no more than 50 parts per million (ppm) in workplace air or 180 mg/m3.

OSHA: The Occupational Health and Safety Administration has set a Permissible Exposure Limit of 500 ppm for n-hexane in workplace air or 1800 mg/m3).

EPA: The Environmental Protection Agency requires that spills or accidental releases of 5,000 pounds or more of n-hexane be reported to the EPA.

Australia [3]

Safe Work Australia has set a maximum 8-hour time weighted average (TWA) exposure for n-hexane of 176 mg/m3.

References

- http://en.wikipedia.org/wiki/N-hexane
- http://www.atsdr.cdc.gov/phs/phs.asp?id=391&tid=68
- http://www.npi.gov.au/resource/n-hexane-sources-emissions
- http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=392&tid=68
- http://www.epa.gov/ttn/atw/hlthef/hexane.html
- http://www.sciencelab.com/msds.php?msdsId=9927187

JANET'S CORNER

Who Am I?

24 Apr 2026

I am born from the marriage of opposites—nitrogen from the sky and hydrogen from fossil fuels—under crushing pressure and intense heat.

My pungent odor is so distinctive that it's used as a warning agent, yet I'm completely colorless.

I am the foundation of fertilizers that feed billions, and without me, modern agriculture simply couldn't exist.

My chemical formula is NH_3, and I'm one of the most widely produced chemicals in the world, essential for both explosives and household cleaners.