CHEMWATCH

BULLETIN

Week of 10 April 2026

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JANET'S CORNER

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GOSSIP

Revolutionary Gas Turbine Generates Power Without Air Compression

Sci Tech Daily · 9 Apr 2026

KIT researchers surpass NASA and achieve a technological breakthrough toward a CO2-neutral energy system.

Earlier experiments with this system could only run for brief moments before the combustion chamber overheated and failed. Now, the team at the Karlsruhe Institute of Technology (KIT) has achieved a major milestone by extending the operation time to more than five minutes.

“This is an important step toward highly efficient and flexible hydrogen energy for a fossil-free energy system,” explains Professor Daniel Banuti, Director of the Institute of Thermal Energy Technology and Safety (ITES).

One of the key advantages of this design is that it eliminates the need to compress air before ignition. “A conventional gas turbine, such as those used in power plants or under aircraft wings, consumes about 50 percent of its power to compress air to the high pressure needed for efficient combustion—power that is then unavailable for electricity generation,” Banuti explains.

The new turbine operates using pressure-gain combustion. Traditional gas turbines rely on mechanical compressors that consume a large portion of their output. In contrast, this system creates the required pressure through detonation waves inside the combustion chamber.

These waves form from fluid-mechanical instabilities, where patterns of vortices and wave interactions naturally increase pressure without moving parts. This approach reduces energy losses, simplifies the system, and improves overall efficiency.

Although the system can operate with different fuels, hydrogen offers clear advantages. Its rapid reaction speed supports stable pressure increases during combustion. This makes it particularly suitable for achieving high efficiency and could enable lighter, more affordable turbine designs for both electricity generation and, potentially, aviation applications.

Integrating a turbine with the combustion chamber to produce electricity introduces additional complexity. “This is extremely difficult because the very fast and intense combustion processes in the chamber make stable energy transfer to the turbine challenging. We are the first to successfully operate such a turbine and generate electricity in the process,” says Banuti.

The research team plans to showcase their compressor-free gas turbine at Hannover Messe, taking place from April 20 to 24, 2026, at the KIT booth in Hall 11, Stand B 06.

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Inside-out peptides are part of a new class of isomerism

Chemistry World · 8 Apr 2026

Large and flexible polycyclic ring systems can effectively turn themselves inside out, giving rise to an overlooked phenomenon termed ‘homeomorphic isomerisation’. This conformational process enables structures to switch between distinct forms and could have applications in metal separation and drug delivery, as well as significant implications for intellectual property.

The rigidity of tethering chains in smaller bicyclic structures can lock them in their conformations

The orientation of the bridgehead atoms in fused ring systems plays a crucial part in determining the molecules’ overall spatial arrangement. In smaller bridged bicycles, the rigidity of the tethering chains often results in conformational locking, where constrained structures like norbornane or bicyclo[2.2.2]octane become fixed into a single orientation. However, the flexibility of larger structures permits a greater degree of freedom, to the point that some are able to invert completely at their bridgehead atoms. ‘Basically, we need two bridgehead entities and three tethers, and we usually need to have at least 10 atoms in these tethers. That’s the minimum requirement,’ explains John Gladysz an organometallic chemist at Texas A&M University in the US.

With the appropriate activation, one tether passes through the ring created by the other two, inverting the entire ring system by rotating the orientation of the bridgehead groups from in to out, or vice versa. How rapidly this process occurs varies between ring systems, and this distinction offers the potential for various applications, says Gladysz.

Gladysz’s team made use of homeomorphic isomerisation of a diphosphine macrobicycle to separate platinum ions from other contaminants

As an example, Gladysz’s team predicted that the phenomenon could aid the separation of metal ions. They filled the bend of a U-tube apparatus with an organic layer containing a rapidly interconverting diphosphine macrobicycle, topping off each arm with an aqueous solution of either platinum chloride or potassium cyanide. Within several hours, the diphosphine ring system had sequestered the bulk of the platinum from one arm to the other, leaving other contaminating metal ions untouched. ‘The out–out form picks up the platinum from the interface, tucks it inside [as the in–in form] for transport,’ explains Gladysz. The reverse homeomorphic process then delivers the platinum at the other end, where it’s trapped by the cyanide.

However, of most interest to Gladysz is the potential to harness slow interconversion for drug delivery. Macrobicyclic peptides are an increasingly popular motif in drug discovery programmes, but their structures are typically vulnerable to digestive...

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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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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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GLP-1 drugs shown to fight arthritis independent of weight loss

refractor.io · 9 Apr 2026

A new study has shown that the popular GLP-1 weight loss drug semaglutide has the power to halt, and to some extent restore, cartilage in people suffering from osteoarthritis (OA). The finding hints at a possible use of the drug beyond weight loss.

In 2017, America's Food and Drug Administration approved the drug semaglutide for treating diabetes. In 2021 the FDA also approved it as a weight loss aid. Since then, some studies have

hinted that the drug – sold popularly as Ozempic, Wegovy, and Rybelsus – might have effectiveness treating a variety of other conditions.

For example, the FLOW trial in 2024 showed that the drug reduced the risk of kidney failure and death from cardiovascular causes in patients with type 2 diabetes and chronic kidney disease. Another 2024 study showed that the drug positively impacted motor activity in Parkinson's patients and helped ward off brain shrinkage and cognitive decline in Alzheimer's patients, although a follow-up study has brought these results into question .

Now, researchers from China have conducted a study that shows another possible off-label use of semaglutide: arthritis prevention.

In the study, which used both humans and mice, the research team first divided obese rodents with arthritis into two groups. One group was given semaglutide, which reduced their appetites. The second group was not given the drug, but was fed exactly the same amount of food eaten by the semaglutide group. This caused the mice in both groups to lose the same amount of weight. It also allowed the researchers to test for the drug's effect beyond weight loss.

The team found that only the mice on semaglutide showed reduced cartilage breakdown as well as a reduction in bone spurs, joint inflammation, and pain – a finding that demonstrated that the effects were likely due to the drug itself, not the accompanying weight loss.

For the human portion of the trial, the team split 20 obese people suffering from knee arthritis into two groups. One group was given only hyaluronic acid injections, a common treatment to lubricate the joints in people with OA. The other group was given the hyaluronic injections as well as semaglutide. At the end of 24 weeks the researchers found that only the people in the semaglutide group reported better physical function scores and about a 17% increase in cartilage thickness.

The researchers themselves point out that the human trial here is...

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Water-based membrane waves through carbon dioxide, blocks other gases

Chemistry World · 8 Apr 2026

The water-based membrane lets carbon dioxide through the nanopores far faster than other gases as it dissolves in water more readily

A thin water layer stabilised by hydrophilic nanopores can facilitate carbon dioxide separation. The new membrane shows better selectivity and permeability than state-of-the-art materials, with a smaller environmental impact.

To separate carbon dioxide from other gases, industrial applications typically rely on methods like amine scrubbing or cryogenic separation. While effective, these technologies are energy-intensive and use hazardous chemicals. Membranes made of nanoporous or polymeric materials offer a simpler, more efficient option but suffer from a trade-off between gas permeability and selectivity. By infusing porous supports with gas-selective liquids, often ionic liquids, high carbon dioxide selectivities can be achieved. However, during operation, their permeability suffers as chemical sorption sites become saturated, leading to blowouts.

Inspired by how leaves absorb carbon dioxide, Anthony Straub at ETH Zurich, Switzerland, brought an idea to his students for an improved carbonation device. ‘I had playfully pitched it to the group as

a project to make a beer that never goes flat,' he recounts, but nobody was interested. 'I think eventually Kian [Lopez] felt bad for me and started testing it.' During that testing, Lopez noticed that carbon dioxide and nitrogen permeated at different rates and suggested abandoning carbonation for gas separation.

As an initial proof of concept, water was pipetted onto anodic aluminum oxide membranes dotted with hydrophilic pores. The result was water layers varying in thickness from 100µm to 190nm. To pass, gases must dissolve in the water, diffuse through it and desorb on the other side.

They found that both selectivity and permeability were governed primarily by the solubility of individual gases. Thanks to carbon dioxide being approximately 40 times more water-soluble than nitrogen, hydrogen or methane, the supported water membranes showed permeability and selectivity rivalling those of state-of-the-art materials. Their permeability increased proportionally as water thickness decreased, while selectivity stayed constant. The prototype operated stably for over a week without water loss and could withstand high pressures, well above the levels required for most industrial applications such as carbon capture or syngas upgrading.

Experiments with commercially available polyvinylidene fluoride (PVDF) and polyethersulfone (PES) membranes left selectivity unchanged, but permeability fell sharply. The researchers attribute this to the formation of thick water layers in large pores, highlighting the importance of optimisation.

New materials that show high permeability and selectivity are discovered fairly...

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AI-designed proteins built from scratch can recognize specific compounds

Phys Org · 9 Apr 2026

by The Korea Advanced Institute of Science and Technology (KAIST)

Professor Gyu Rie Lee of the Department of Biological Sciences successfully designed artificial proteins that selectively recognize specific compounds using AI through joint research with Professor David Baker. The research, published in the journal Nature Communications , is characterized by using AI to design proteins that recognize specific compounds from scratch (de novo) and implementing them as functional biosensors.

While the conventional approach mainly involved searching for natural proteins or modifying some of their functions, this research is highly significant in that it "custom-built" proteins with desired functions through AI-based design and even completed experimental verification.

In particular, the research team successfully designed a protein that selectively recognizes the stress hormone cortisol and implemented an AI-designed biosensor based on it. This is evaluated as a case that extends beyond protein design to actual measurable sensor technology, solving the long-standing challenge of small-molecule recognition in the field of protein design.

These research results have applications in fields including disease diagnosis, new drug development and environmental monitoring. The technology can precisely detect biomarkers in the blood to diagnose diseases early and contribute to the development of targeted therapies through the design of proteins that selectively recognize specific molecules.

Furthermore, it is expected that the implementation of customized biosensor technology will become possible, such as real-time monitoring of air and water quality through the development of sensors that detect environmental pollutants.

Designing new proteins (de novo proteins) that recognize compounds has been considered a challenge in the field of protein design for a long time because it requires precise calculations at the atomic level. The research team developed an AI model that precisely reflects protein-ligand interactions and successfully designed binding proteins using it.

As a result, artificial binding proteins were designed for six types of compounds, including metabolites and small-molecule drugs, and their functions were verified through experiments. In particular, a cortisol biosensor was developed by designing a chemical-induced dimer based on a new protein that binds with cortisol.

A provisional patent for the relevant design technology has been filed in the United States.

Professor Gyu Rie Lee stated, "This research experimentally proves that AI can be used to design proteins that precisely recognize specific compounds," and added, "We plan to expand this into protein design technology that can be utilized in various fields such as disease diagnosis, new drug development, and environmental...

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Hidden Danger: Widely Used Pesticides Linked to 150% Higher Cancer Risk

Sci Tech Daily · 9 Apr 2026

Researchers have identified a link between widespread pesticide exposure and cancer risk, driven by subtle biological changes that emerge long before diagnosis.

A sweeping new study in Nature Health is reshaping how scientists think about pesticide exposure, pointing to a strong connection between everyday environmental contact with these chemicals and a higher risk of cancer.

By combining environmental monitoring, national cancer registry data, and biological analyses, scientists from the IRD, Institut Pasteur, University of Toulouse, and the National Institute of Neoplastic Diseases (INEN) in Peru provide new insight into how pesticide exposure may contribute to certain cancers.

Pesticides are commonly found in food, water, and the broader environment, often as complex mixtures rather than single compounds. This has made their health effects difficult to measure, since most previous research has focused on individual chemicals under controlled conditions that do not reflect everyday exposure. This study takes a more comprehensive approach, capturing the complexity of real-world conditions.

Peru offers a unique setting due to its mix of intensive farming regions, diverse ecosystems, and pronounced social and geographic inequalities. Cancer has become a growing public health concern, alongside rising pesticide exposure.

The findings show that certain populations, especially Indigenous and rural communities, face higher exposure levels. On average, these groups encounter 12 different pesticides at elevated concentrations.

Researchers created detailed models to map pesticide pollution across the country. The analysis included 31 agricultural chemicals, none of which are currently classified as known human carcinogens by the World Health Organization (WHO), and tracked how they spread through the environment.

“We first modeled the dispersion of pesticides in the environment over a six-year period, from 2014 to 2019, which allowed us to create a high-resolution map and identify areas with the highest risk of exposure,” explains Jorge Honles, PhD in epidemiology at the University of Toulouse.

The team then compared these maps with geolocation data from more than 150,000 cancer cases recorded between 2007 and 2020. This revealed regions where both pesticide exposure and cancer rates were higher. In these areas, the likelihood of developing cancer was about 150% greater.

“This is the first time we have been able to link pesticide exposure, on a national scale, to biological changes suggesting an increased risk of cancer,” explains Stéphane Bertani, a researcher in molecular biology at the French National Research Institute for Sustainable Development (IRD), at the PHARMA-DEV laboratory (IRD/University of Toulouse).

The research found...

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New cold-hardy electrolyte could potentially double battery range of EVs

New Atlas · 7 Apr 2026

White walkers can't have EVs. Not because they are lifeless zombies who probably can't drive, but because the extreme cold of the north would severely impact the lithium batteries. Also, the region is quite large, so EVs would likely run out of juice before they could cover a good portion of its 1,100-mile length. Scientists in China may have solved both problems with a new lithium battery electrolyte that withstands cold temperatures and could double EV range.

A joint team of researchers from Nankai University in Tianjin and the Shanghai Institute of Space Power Sources (SISP) has developed a hydrofluorocarbon-based electrolyte that significantly enhances the performance of lithium batteries. As reported by the South China Morning Post , the new electrolyte more than doubles the energy density of existing batteries at room temperature, meaning batteries of the same size can last twice as long!

The researchers also claim that the new electrolyte remains stable in extreme cold, allowing batteries to function seamlessly in temperatures as low as -94 ºF (-70 ºC), well over 2.5 times the temperature of your refrigerator.

Chemical batteries, such as lithium batteries, utilize electrolytes – a chemical medium that allows ions to flow between the positive and negative electrodes, converting stored chemical energy into electrical current. In lithium batteries, the electrolytes are usually nitrogen- and oxygen-based compounds, mainly because of their effectiveness at dissolving lithium salts.

However, these electrolytes are sensitive to operating temperatures . Cold temperatures increase viscosity and slow down ion mobility, reducing charge transfer efficiency. When this happens, the battery delivers less power, takes longer to charge, and loses usable capacity, providing less runtime than its stored energy would suggest. This is why lithium batteries appear to die quickly in

extreme cold. In certain conditions, such as charging the battery when the temperature is below 32 °F (0 °C), permanent damage may occur.

In the study published in Nature , the researchers outlined how their solution, synthesized hydrofluorocarbon-based (hydrogen, fluorine, and carbon) electrolytes, eliminates this problem in lithium batteries. The cold-resistant electrolyte offers improved stability and lower viscosity at low temperatures, enabling batteries to continue operating efficiently below -94 °F.

Another outstanding feature of the electrolyte is its energy density – the amount of charge it can store per weight. In the study, the team created lithium metal pouch cells that achieved an energy density of 317 watt-hours per pound (Wh/lb) at room...

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Non-producing oil and gas wells may emit microbial methane at rates 1,000 times higher than previously estimated

Phys Org · 9 Apr 2026

Microbial methane leaking from non-producing oil and gas wells is being emitted at rates about 1,000 times higher than previously estimated, according to a new study led by McGill University researchers. "Origins of Subsurface Methane Leaking from Nonproducing Oil and Gas Wells in Canada," by Gianni Micucci and Mary Kang, is published in Environmental Science and Technology .

"Methane is a powerful greenhouse gas when released into the atmosphere, regardless of its origin. In particular, this study implies that non-producing oil and gas wells could continue to emit microbial methane long after the targeted formation has been fully depleted," said Kang, study co-author and Associate Professor of Civil Engineering.

"However, the exact source of this methane is often unclear because the subsurface is a complex system with multiple gas-bearing formations," she said.

The team not only found microbial methane in 23% of the non-producing wells sampled—roughly three times higher than earlier estimates—but also detected traces of microbial methane in another 50% of them.

Canada has nearly 500,000 non-producing oil and gas wells . While not all leak methane, the study noted previous research by the same team that found the top 12% of emitting wells account for 98 percent of emissions from this source. Understanding where these emissions come from and their nature is key to managing them effectively, the researchers said.

The team collected samples from 401 non-producing wells across the country, particularly in Western Canada where more than 90% of these wells are located. "Non-producing wells" included inactive wells, those that have never produced and those that have ceased production.

"For this study, we looked at chemical properties such as gas composition and stable isotopic signatures, which enable a better understanding of the origins of the leaking methane. This analysis is highly sensitive, and we were able to reliably characterize the origins of emissions from 100 of the 401 wells sampled," said Micucci, study co-author and Postdoctoral Researcher in Civil Engineering.

The researchers showed that most methane leaks typically derive from "thermogenic" sources—usually found in petroleum formations deep below ground, where organic matter derived from ancient life "cooks" under high temperatures. But previous research appears to have

underestimated the contribution of microbial methane, which is typically found in shallow formations.

The researchers said the findings raise new questions about how methane moves underground and escapes through wells.

"Our results raise the question of whether the studied wells were...

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CURIOSITIES

Earliest known vomit: This ancient predator clearly wasn't picky

refractor.io · 10 Apr 2026

Sometimes, the most important paleontological discoveries may come from the most disgusting materials.

In 2021, paleontologists discovered a specimen in Bromacker, Germany, that dates to the early Permian period, approximately 290 million years old. To an untrained eye, the specimen wouldn't be more than just a few whitish bits of densely packed bones in sandstone and sediment. But experts recognized those clustered fragments as the fossilized vomit of an ancient creature, holding insights into its diet, physiology, food chain, and ecosystem.

Finding the bones compactly clustered was "so far really new and unique. I was really surprised to see this," the co-author of the study, Arnaud Rebillard at Museum für Naturkunde in Berlin, told Refractor in an interview. "I immediately thought that it may be something that has been expelled from a predator."

The specimen, named MNG 17001, is an irregularly shaped, three-dimensionally preserved cluster, measuring roughly 2 inches long, 1.2 inches cm wide, and 0.5 inches thick (5 cm x 3 cm x 1.4 cm). Using micro-CT scans, Rebillard and his colleagues digitally segmented the content to reveal the details without destroying the fossil itself.

The researchers identified a total of 41 tiny bones, all under 20mm, of at least three different animals. Thanks to extensive excavations made at the Bromacker site over the last 30 years, the team was able to compare the bones with other fossils found there.

Among the identifiable species, one of the bones belonged to Thuringothyris mahlendorffae , a small reptile. They also found an upper arm bone of Eudibamus cursoris , "which is quite an iconic animal from Brocker," Rebillard told us. "Famous because it is a bipedal reptile."

The third bone was bigger than the rest and corresponded to a metapodial element (a bone from the foot or hand). The data indicate that the creature belongs to an unidentified diadectid. "It was kind of a bulky, big animal that was around 60 cm (24 inches) long," says Rebillard.

In the Bromacker locality, previously found fossil bones were scattered. However, MNG 17001 bore densely compacted bones, so the team hypothesized that an animal devoured three different animals, at least in parts, and then regurgitated them, i.e., vomited them. But the bone clump could also have been the result of feces (known as coprolite when it's found in a fossilized state).

"So our goal was to identify 'is that a coprolite or a regurgitalite?',"...

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Most people get food’s environmental impact completely wrong, study finds

Science Daily · 29 Sep 2026

A new study offers fresh insight into how people judge the environmental impact of the foods they eat, and the results suggest many are getting it wrong. These misunderstandings point to a clear need for simple environmental impact labels to help guide better choices.

Researchers from the University of Nottingham's School of Psychology asked 168 participants in the UK to sort a wide variety of supermarket foods into environmental impact categories of their own making. The findings revealed consistent misconceptions about which foods are more or less harmful to the environment. The study was published in the Journal of Cleaner Production .

Why Food Choices Matter for the Environment

Food production plays a major role in environmental issues, including greenhouse gas emissions and biodiversity loss. Encouraging more sustainable eating habits depends in part on understanding how people perceive the environmental footprint of different foods.

Scientists measure a food's environmental impact using a life cycle assessment, which tracks the entire process from production to disposal. This "cradle-to-grave" approach considers inputs such as fertilizer, water, and energy, along with outputs like emissions and waste. It evaluates multiple factors, including greenhouse gas emissions (often as CO 2 equivalents), land use, and water use.

Study Examines Real-World Grocery Choices

Earlier research has typically focused on a limited selection of foods. This project, funded by the UKRI's Smart Data Research UK, is the first to explore how people perceive the environmental impact of a broad range of products commonly found in a typical grocery shop.

Participants were also shown scientific estimates of each product's environmental impact and asked whether the results were higher or lower than they expected.

Key Misconceptions About Food and Sustainability

The study found that people tend to judge food impact using two main factors: whether the food comes from animals or plants, and how processed it is. In general, participants assumed that meat and dairy products, as well as highly processed foods, are worse for the environment.

However, these assumptions do not always match reality. Many participants overestimated the environmental impact of processed foods while underestimating the impact of water-intensive products (e.g. nuts). They were also surprised to learn how much higher the environmental impact of beef is compared to other meats like chicken.

Labels Could Help People Make Better Choices

Daniel Fletcher, Postdoctoral researcher from the School of Psychology is lead author on the study, he said: "We designed an...

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Scientists discover hidden gut trigger behind ALS and dementia

Science Daily · 10 Feb 2026

Researchers at Case Western Reserve University have uncovered a finding that could reshape how doctors approach two of the most devastating brain disorders. Their work points to an unexpected player in disease progression: gut bacteria.

The team identified a clear connection between microbes in the digestive system and brain damage seen in Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Dementia (FTD). They found that certain bacterial sugars can trigger immune reactions that kill brain cells, and importantly, they also identified ways to stop this process.

FTD primarily impacts the frontal and temporal regions of the brain, leading to changes in personality, behavior, and language. ALS, on the other hand, targets motor neurons, causing progressive muscle weakness that eventually leads to paralysis.

The underlying causes of both conditions are still not fully understood. Scientists have explored a range of possible factors, including genetics, environmental exposures, brain injuries, and diet.

A Gut-Brain Mechanism That Explains Disease Risk

The study, published in Cell Reports, helps answer a long-standing question about why some people develop these diseases while others do not. Researchers uncovered a molecular pathway that links gut activity to brain damage, particularly in people with certain genetic mutations.

"We found that harmful gut bacteria produce inflammatory forms of glycogen (a type of sugar), and that these bacterial sugars trigger immune responses that damage the brain," said Aaron Burberry, assistant professor in the Department of Pathology at the Case Western Reserve School of Medicine.

Among the 23 ALS/FTD patients studied, 70% had elevated levels of this harmful glycogen. In contrast, only about one-third of individuals without these diseases showed similar levels.

New Treatment Targets and Hope for Patients

These findings could have immediate clinical relevance. By identifying harmful gut sugars as a driver of disease, researchers now have new targets for treatment. The study also highlights potential biomarkers that could help doctors identify patients who may benefit from therapies focused on the gut.

The results open the door to new treatments aimed at breaking down these damaging sugars in the digestive system. They also support the development of drugs designed to act on the connection between the gut and the brain, offering hope for slowing or preventing disease progression.

Alex Rodriguez-Palacios, assistant professor in the Digestive Health Research Institute at the School of Medicine, said the team was able to reduce these harmful sugars in their experiments, which "improved brain health and extended lifespan."

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Scientists solve 30-year mystery of a hidden nutrient that protects the brain and fights cancer

Science Daily · 21 Aug 2026

An international team of researchers, led in part by scientists at the University of Florida and Trinity College Dublin, has solved a long-standing puzzle in human biology: how our cells absorb a crucial micronutrient linked to brain health and cancer defense.

Queuosine -- pronounced "cue-o-scene" -- is a vitamin-like compound that the body cannot produce on its own. Instead, it comes from certain foods and from bacteria living in the gut. Despite its importance, this nutrient remained largely overlooked for decades.

Discovery of the Gene That Lets It Enter Cells

In a study published this week in the Proceedings of the National Academy of Sciences , scientists identified the gene responsible for transporting queuosine into human cells. This breakthrough could eventually support the development of new treatments that take advantage of the nutrient's roles in memory, learning, and cancer suppression.

"For over 30 years, scientists have suspected that there had to be a transporter for this nutrient, but no one could find it," said Valérie de Crécy-Lagard, a UF/IFAS microbiology and cell science distinguished professor and department associate chair, as well as one of the study's principal investigators. "We've been hunting for it for a long time. This discovery opens up a whole new chapter in understanding how the microbiome and our diet can influence the translation of our genes."

The study received support from multiple national health organizations, including the National Institutes of Health , Research Ireland (formerly Science Foundation Ireland), and Health and Social Care in Northern Ireland.

Queuosine plays a key role in how the body builds proteins. It alters transfer RNA, the molecules responsible for helping cells interpret DNA and produce proteins correctly.

"It's like a nutrient that fine-tunes how your body reads your genes," she said. "The idea that this small compound, which people have barely heard of, plays such an important role, is fascinating."

SLC35F2 Identified as the Missing Transporter

For years, scientists did not know how queuosine entered cells. The discovery of the gene SLC35F2 fills that gap and provides a foundation for future research. This gene had previously been studied for its role in allowing viruses and certain cancer drugs to enter cells, but its normal function in healthy biology was unclear until now, de Crécy-Lagard explained.

"We have known for a long time that queuosine influences critical processes like brain health, metabolic regulation, cancer and even responses to stress, but until...

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African swine fever: A novel model assesses transmission between domestic pigs and wild boar

Phys Org · 9 Apr 2026

African swine fever (ASF) is one of the most devastating diseases affecting domestic pigs and wild boars worldwide. Since its introduction into Europe, this deadly virus has spread widely, threatening pig production and causing significant economic losses. Understanding the mechanisms of transmission between domestic pigs and wild boars is essential for developing effective control

strategies. However, this has proven to be highly challenging—not only due to the multiple transmission pathways between animals and farms, but also because surveillance data on ASF in wild boar populations remain limited.

Researchers from INRAE, ENVT and ANSES have developed an innovative multi-host epidemiological model incorporating both pig farms and wild boar habitats and calibrated using empirical outbreak data. The model uses detailed data from the first phase of the Romanian epidemic (June to December 2018), including farm registries, environmental data on wild boar distribution, and the temporal and spatial patterns of infection in both pig farms and wild boar populations. Romania has remained a major hotspot for ASF in Europe, accounting for 66% of reported pig farm outbreaks in the EU in 2024, according to the latest EFSA report.

The work is published in Nature Communications .

By calibrating the epidemiological model to the observed data, it was possible to infer the most plausible transmission pathways during this period of the Romanian epidemic and estimate the relative contribution of each.

The results indicate that approximately 60% of infections in pig farms originated from other infected farms, highlighting inter-farm transmission as the primary driver sustaining the outbreak. However, a substantial proportion of cases—around 27%—was attributed to nearby infected wild boar populations, underscoring the important role of wildlife as a source of infection and the need for stronger biosecurity to reduce contact at the wildlife-domestic interface.

In wild boar populations, approximately 40% of infections were associated with neighboring infected farms, highlighting the bidirectional nature of transmission between domestic and wild hosts.

Researchers were able to conclude that areas with high forest cover—favorable habitats for wild boars—played a key role in the spread and persistence of the ASF virus within wild boar populations.

The results demonstrate that the spread of ASF in Romania cannot be explained by inter-farm transmission alone. Moreover, these findings represent a significant step toward more effective management of emerging diseases transmitted between domestic and wild species, particularly in Europe.

Brandon Hayes et al, A multi-host mechanistic model of African swine fever emergence and...

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Chemists think they know what happened on board the Mary Celeste

Chemistry World · 7 Apr 2026

A rapid explosion of ethanol vapours – which would have left behind no signs of damage – may be the reason why sailors found the infamous ship the Mary Celeste abandoned, according to chemists Jack Rowbotham and Frank Mair at the University of Manchester, UK. The pair demonstrated this idea using a model ship during a recent Channel 5 documentary , producing what they believe to be ‘a very convincing case as to what may have happened’.

Sailors spotted the Mary Celeste in December 1872 off the coast of the Azores, a group of islands around 900 miles west of Portugal. Despite the ship’s hold containing nearly all its original cargo, the captain, his family and the remaining crew members were no longer on board. No trace of the crew

was ever found. Theories soon began to circulate as to what may have happened, including piracy, natural disasters, illness and even a supernatural attack.

'The Mary Celeste was a merchant ship that was sailing from New York to Genoa in Italy, and it was transporting a cargo of industrial-strength ethanol,' says Rowbotham. The ship contained around 1700 barrels of ethanol that was often used by winemakers to fortify wines.

Jack Rowbotham (left) and Frank Mair celebrate on the set of the Channel 5 documentary after a successful test of their ethanol vapour explosion hypothesis

An inquest later revealed that nine of the barrels were empty, likely due to the barrels' more porous wood allowing the ethanol to seep out. Logbooks from the crew also showed that the ship sailed through rough weather during its voyage, causing the crew to batten down the hatches, inadvertently trapping the ethanol vapours. As the ship entered warmer climes, the ethanol vapours would have heated up above ethanol's flashpoint of 13°C.

Rowbotham explains that a spark – caused perhaps by a loose ember, a smoking pipe or some metal rubbing together – could have then triggered a rapid explosion. Such an event may have caused the crew to either flee the ship in fear or even physically thrown them overboard, leaving the ship abandoned. Crucially, there would have been no signs of any burning on the ship, despite ethanol flames reaching up to 2000°C, as the explosion was 'over in a second', Rowbotham says.

Using a scaled-down 1:18 model of the ship, Rowbotham and Mair have now demonstrated that an explosion of ethanol vapours could...

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This Diet–Gut Interaction Could Transform Fat Into a Calorie-Burning Machine

Sci Tech Daily · 9 Apr 2026

Gut bacteria can convert white fat into energy-burning beige fat through diet-driven signals, offering new therapeutic targets for metabolic diseases.

Researchers at City of Hope, along with collaborators at the Broad Institute and Keio University, have identified how certain gut bacteria interact with diet to trigger a metabolic shift in mice, turning energy-storing white fat into calorie-burning beige fat.

Published in Nature , the study found that a low-protein diet activates a specific group of gut microbes. These microbes release chemical signals that circulate through the body and prompt fat tissue to burn energy instead of storing it. The results reveal a previously unknown biological link between diet, the gut microbiome, and metabolic health—a connection that could guide future treatments for obesity, diabetes, and related conditions.

"Fat tissue is not fixed — it's surprisingly adaptable," said Kenya Honda, M.D., Ph.D., co-senior author of the study and adjunct professor at City of Hope. "We found that certain gut bacteria can sense what the host is eating and translate that information into signals that tell fat cells to burn energy."

Most fat in adults is white fat, which stores excess calories. Beige and brown fat, in contrast, burn energy to produce heat and help regulate metabolism. Newborns have higher levels of brown fat, but these stores decrease over time. Scientists have long sought safe ways to convert white fat into beige fat, a process known as "beiging," as a potential way to improve metabolic health.

In experiments, mice on a low-protein diet developed significant amounts of beige fat only when the right gut bacteria were present. Germ-free mice that lacked a microbiome did not show this fat-burning response when given the same diet.

“This told us the diet alone wasn’t enough,” Honda said. “The gut microbiome was essential.”

The team identified four bacterial strains that are necessary to trigger fat browning. When these microbes were introduced into mice along with a low-protein diet, the animals converted white fat into beige fat, gained less weight, improved glucose control, and had lower cholesterol levels.

Instead of acting through a single mechanism, the bacteria worked through a coordinated two-step process. One signal altered bile acids and pushed fat cells toward a calorie-burning state. A second signal prompted the liver to release FGF21, a hormone that boosts metabolism. Disrupting either signal eliminated the fat-burning effect, showing that both are required.

“This work underscores how the gut...

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The Protein “Sabotaging” Aging Muscle Recovery Could Be Key to Surviving Aging

Sci Tech Daily · 9 Apr 2026

UCLA researchers have found that specific molecular changes in mice may actually provide protective effects instead of causing harm.

As people age, muscles take longer to recover after injury, a challenge that many older adults experience firsthand.

A study from UCLA using mice points to an unexpected explanation. Muscle stem cells in older tissue build up higher levels of a specific protein that slows their ability to activate and repair damage, yet at the same time helps them endure the more stressful conditions found in aging tissue.

Published in the journal Science , the findings indicate that some biological changes linked to aging may serve a protective role rather than being purely harmful. “This has led us to a new way of thinking about aging,” said Dr. Thomas Rando, senior author of the new study and director of the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research at UCLA.

“It’s counterintuitive, but the stem cells that make it through aging may actually be the least functional ones. They survive not because they’re the best at their job, but because they’re the best at surviving. That gives us a completely different lens for understanding why tissues decline with age.”

The team, led by postdoctoral scholars Jengmin Kang and Daniel Benjamin, analyzed muscle stem cells taken from both young and old mice. They found that levels of a protein called NDRG1 rose sharply with age, reaching about 3.5 times higher in older cells compared to younger ones. This protein acts as a brake inside the cell by suppressing the mTOR signaling pathway, which normally drives cell activation and growth.

To determine whether NDRG1 was behind the slower repair seen in older muscle, the researchers allowed mice to age naturally to roughly the equivalent of 75 human years, then inhibited the

protein’s activity. Once NDRG1 was blocked, aged stem cells quickly regained youthful behavior, activating faster and improving muscle repair following injury.

This improvement came with a drawback. Without the protective influence of NDRG1, fewer stem cells remained over time, reducing the tissue’s capacity to recover from repeated damage.

“Think of it like a marathon runner versus a sprinter,” said Rando, who is also a professor of neurology at the David Geffen School of Medicine at UCLA. “The stem cells in young animals are hyper-functioning — really good at what they do, namely sprinting, but they’re not good for...

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AI diffusion models tailor drug molecules to custom-fit protein targets, speeding drug development and evaluation

Phys Org · 9 Apr 2026

University of Virginia School of Medicine scientists have developed a bold new approach to drug development and discovery that could dramatically accelerate the creation of new medicines. UVA's Nikolay V. Dokholyan, Ph.D., and colleagues have developed a suite of artificial intelligence-powered tools, called YuelDesign, YuelPocket and YuelBond, that work together to transform how new drugs are created. The centerpiece, YuelDesign, uses a cutting-edge form of AI called diffusion models to design new drug molecules tailored to fit their protein targets exactly, even accounting for the way proteins flex and shift shape during binding.

A companion tool, YuelPocket, identifies exactly where on a protein a drug can attach, while YuelBond ensures the chemical bonds in designed molecules are accurate. Together, the approach is poised to improve both how new drugs are designed and how quickly and efficiently existing drugs can be evaluated for new purposes.

"Think of it this way: Other methods try to design a key for a lock that's sitting perfectly still, but in your body, that lock is constantly jiggling and changing shape. Our AI designs the key while the lock is moving, so the fit is much more realistic," said Dokholyan, of UVA's Department of Neurology. "This could make a real difference for patients with cancer, neurological disorders and many other conditions where we desperately need better drugs targeting these wiggly proteins but keep hitting dead ends."

Dokholyan and his team have described the development and results of these tools in papers in the journals Proceedings of the National Academy of Sciences , Journal of Chemical Information and Modeling and Science Advances . The research team includes Wang, Dong Yan Zhang, Shreshty Budakoti and Dokholyan.

The average cost of developing a new drug has been estimated to reach or exceed $2.6 billion, and almost 90% of new drugs fail when they reach human testing. That is due, in no small part, to the difficulty of predicting how molecules in a drug will interact (bind) with their targets in the body. If a molecule doesn't bind exactly as intended at exactly the right spot, the drug won't work, or could have unwanted, harmful side effects.

Artificial intelligence has helped address this problem, greatly accelerating drug design, but Dokholyan's work takes it to the next level. His YuelDesign overcomes limitations of the existing

options by designing drug molecules while treating proteins as flexible, dynamic structures, not the rigid and...

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The world's "oldest octopus" was never an octopus

Science Daily · 7 Apr 2026

A well-known 300-million-year-old fossil once believed to be the oldest octopus ever discovered has been reclassified after new analysis revealed it is something entirely different. The specimen had even earned a place in the Guinness Book of Records, but scientists now say that distinction was based on a misinterpretation.

The confusion traces back to events that happened long before the fossil formed. As the animal decayed hundreds of millions of years ago, its body changed in ways that later made it resemble an octopus when preserved in rock.

Researchers used cutting-edge synchrotron imaging to examine the inside of the fossil in detail. This powerful technique allowed them to detect tiny structures that cannot be seen with the naked eye. Inside the rock, they found small tooth-like features that changed everything.

The fossil, known as Pohlsepia mazonensis, is not an octopus. Instead, it belongs to a group related to modern Nautilus, marine animals that have multiple tentacles and a distinctive external shell.

The findings, published today (April 8, 2026) in Proceedings of the Royal Society B , resolve a long-standing mystery about octopus evolution that has puzzled scientists for decades. The discovery also provides the earliest known example of preserved soft tissue from a nautiloid and removes the fossil's status as the "oldest octopus" from the record books.

Decay Led to a Scientific Misidentification

Dr. Thomas Clements, lead author and Lecturer in Invertebrate Zoology at the University of Reading, said: "It turns out the world's most famous octopus fossil was never an octopus at all. It was a nautilus relative that had been decomposing for weeks before it became buried and later preserved in rock, and that decomposition is what made it look so convincingly octopus-like.

"Scientists identified Pohlsepia as an octopus 25 years ago, but using modern techniques showed us what was beneath the surface to the rock, which finally cracked the case. We now have the oldest soft tissue evidence of a nautiloid ever found, and a much clearer picture of when octopuses actually first appeared on Earth.

"Sometimes, reexamining controversial fossils with new techniques reveals tiny clues that lead to really exciting discoveries."

The fossil was originally discovered in Illinois, USA, and first described in 2000. It quickly became important in studies of cephalopod evolution, with scientists interpreting its features as evidence of eight arms, fins, and other traits associated with octopuses. This pushed the known origin of...

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REACH UPDATE

ECHA supports PFAS restriction with targeted derogations

ECHA · 26 Mar 2026

ECHA/NR/26/17

ECHA's two scientific committees support EU-wide action with appropriate derogations and controls to address the growing and long-lasting risks per-and polyfluoroalkyl substances (PFAS) pose to people and the environment.

Helsinki, 26 March 2026 – The Risk Assessment Committee (RAC), in its final opinion, and the Socio-Economic Analysis Committee (SEAC), in its draft opinion, support an EU-wide restriction, subject to specific derogations, on the manufacture, placing on the market and use of PFAS. The Committees also recommend that any restriction should be complemented by effective measures to minimise emissions. The scientific conclusions of RAC and the draft opinion of SEAC mark a major step toward EU-level measures on PFAS.

Today’s publication also launches the 60-day consultation on SEAC’s draft opinion, with stakeholders invited to submit comments until 25 May.

RAC final opinion

RAC concludes that PFAS pose growing risks to people and the environment. They are highly persistent, remaining in the environment for long periods, travelling long distances, contaminating groundwater and soil, while some cause serious health issues, such as cancer and reproductive harm. The Committee considers that regulatory measures currently in place are not sufficient to control their emissions and, therefore, further EU-wide regulatory action is needed to control these risks.

RAC recommends risk management measures to minimise emissions if derogations for specific uses are confirmed by the decision makers. These measures include site-specific PFAS management plans for manufacturers and industrial users, including monitoring of emissions, supply-chain communication on PFAS use, clear consumer labelling and instructions for safe use and disposal. RAC also calls for reporting of PFAS emissions from manufacturing and industrial sites to ECHA.

Roberto Scazzola, Chairperson of RAC said:

"The final RAC opinion and scientific evidence is clear that PFAS can cause risks to people and environment if not properly controlled. An EU-wide restriction is, therefore, an effective measure to reduce these risks. If derogations are allowed, RAC recommends measures to minimise PFAS emissions."

SEAC’s draft opinion

SEAC's draft opinion highlights that PFAS are used in many different applications across Europe. EU-wide action is, therefore, needed to avoid trade distortions and maintain a level playing field in the internal market. The Committee considers that targeted derogations are needed for specific PFAS uses, when this is justified by the available evidence that alternatives are not available as well as by the assessment of costs and benefits, to ensure the restriction remains proportionate.

The SEAC draft opinion also supports introducing risk management measures to minimise PFAS emissions for derogated uses, as recommended by RAC. However, based on currently available information, the Committee cannot conclude whether these specific measures are proportionate.

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European Chemical Agency supports EU-wide restriction on 'forever chemicals'

EIA · 31 Mar 2026

The European Chemical Agency (ECHA) has published its expert opinions in support of bloc-wide restrictions on per- and polyfluoroalkyl substances (PFAS, also known as 'forever chemicals'), including climate-harming fluorinated refrigerant gases.

The long-awaited opinions were drawn up by its Risk Assessment Committee (RAC) and Socio-Economic Analysis Committee (SEAC) on the proposed EU universal PFAS restriction.

The proposal to put restrictions on the use of PFAS and placing them on the market was submitted by Germany, the Netherlands, Sweden, Norway and Denmark in 2023.

During the initial consultation, ECHA received more than 5,600 comments, an unprecedented number demonstrating the level of interest in this proposal.

In June 2025, ECHA published a 290-page updated background document to the proposal and now, after a detailed review, its expert committees have released their opinions.

The RAC final opinion concluded that PFAS pose a risk to human health and the environment, while both committees agreed that an EU wide, group-based PFAS restriction is the most appropriate way to address this risk.

The draft SEAC opinion concluded that, with some time-limited derogations, such a restriction is implementable, manageable and enforceable. A further consultation on the draft opinion is open until 25 May.

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REGULATORY UPDATE

ASIA PACIFIC

Taipei among top 10 most polluted cities in the world

IQ Air · 29 Mar 2026

As of March 29, 2026, at 9:10 AM PT, Taipei, Taiwan, is experiencing poor air quality with the Air Quality Index (AQI) of 135, placing conditions in the "unhealthy for sensitive groups" range.

People who are more sensitive to air pollution, including children, older adults, pregnant individuals, and those with heart or lung conditions, should limit strenuous outdoor activity. Symptoms such as coughing, throat irritation, and shortness of breath may occur.

Air quality is dynamic and, like the weather, can change frequently. Taipei ranked as the 2nd most polluted major city in the world on Sunday morning.

Click here for a real-time air quality map of Taipei.

While the air quality today is poor, it’s worth noting that the average PM2.5 concentration in 2025 for Taipei was 10.4 µg/m³, corresponding to an AQI of 43 (“good”), and was twice the WHO annual guideline of 5 µg/m³.

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APVMA releases Q2 performance report for 2025–26

APVMA · 31 Mar 2026

The Australian Pesticides and Veterinary Medicines Authority (APVMA) has released its quarter 2 (Q2) performance report for the 2025–26 financial year.

Overall, the second quarter report indicates the scale of actions being taken across the agency to fulfil its regulatory responsibilities and reveals a range of crucial decisions have been made on agricultural and veterinary (agvet) chemical products.

In Q2, the APVMA completed 1,358 activities related to regulatory decisions (2,863 year-to-date), including 546 product registrations/permits and 20 emergency permits. This represents an increase of almost 100 product registration completions against the first quarter.

The Authority also completed 73 compliance investigations and initiated removal of 378 unauthorised products from online marketplaces, remaining on-track to exceed the 2024–25 full-year figure of 1,277.

During Q2, 74.4% of all applications for approval of an active or a label, registration of a product or the issuing of a permit were completed within statutory timeframes, against a target of 90%, below the previous quarter (80.2% in Q1).

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Trans-Tasman pilot for manufacturers of agricultural chemicals and veterinary medicines to register products in both countries

APVMA · 31 Mar 2026

Manufacturers of agricultural chemicals and veterinary medicines looking to enter or expand into the trans-Tasman market can now take part in an improved registration pathway pilot to get their products into the hands of customers in both countries.

New Zealand Food Safety and the Australian Pesticides and Veterinary Medicines Authority (APVMA) are inviting expressions of interest from industry for joint Australia–New Zealand product registrations.

"By streamlining the registration process for agricultural compounds and veterinary medicines across our 2 countries, we are working to remove obstacles for the primary sectors and the communities that depend on them," says New Zealand Food Safety deputy director-general Vincent Arbuckle.

APVMA Chief Executive Officer Scott Hansen says: "We have similar regulatory approaches, so it makes sense for us to increase the scope of our teamwork to position Australia and New Zealand as an attractive region for new product launches and innovation."

We are seeking expressions of interest from companies with:

new products intended for registration in both Australia and New Zealand, or

products already registered in one country that could be advanced more quickly in the other market.

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AMERICA

West Virginia’s artificial food dye ban still blocked by judge; bill to address it died in Senate

West Virginia Watch · 25 Mar 2026

A GOP-backed measure banned a list of colorful artificial dyes beginning in groceries and school meals; a judge said it was likely ‘unconstitutionally vague’

A GOP-backed bill meant to make changes to West Virginia’s ban on certain colorful artificial dyes failed to make it to the governor’s desk this year. For now, the food dye ban – one of the first of its kind in the country – remains temporarily blocked by a federal judge.

While the bill aimed at tweaking the artificial food dye ban passed the House of Delegates, it faced tougher scrutiny in the Senate, where members wanted to exempt West Virginia-made popsicles, pepperoni rolls and more from the synthetic food dye regulations.

Ultimately, the Senate parked the measure, which faced seven amendments aimed at exempting West Virginia food makers and products, in the final days of session.

Sen. Eric Tarr, R-Putnam, thought it wasn't right for lawmakers to overstep federal food regulations. And, he felt it could hurt West Virginia-based food makers.

"It is a terrible look for attracting industry to West Virginia, and especially when we already have a lot of that industry here in West Virginia," said Tarr, who sponsored amendments to the bill. "That sends a terrible message across the country and in the world about coming to West Virginia."

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New standard for chemical safety of reusable containers in the US and Canada

FPF · 17 Mar 2026

On February 25, 2026, PR3 and CSA Group shared the publication of a new standard for the design and performance of reusable containers for foodstuffs, beverages, and other consumer goods. The standard, RES-001:26/CSA R304:26, is recognized by both the Standards Council of Canada (SCC) and the American National Standards Institute (ANSI) and was informed by more than 100 stakeholders across industry, government, and academia.

The repeated use and washing of reusable containers can degrade non-inert materials, potentially leading to increased rates of migration and the migration of more chemicals over time (FPF reported). To protect consumers, the standard specifies harmful materials and chemical groups that cannot be used to manufacture reuse containers. Examples of these include melamine, bisphenols, parabens, per- and polyfluoroalkyl substances (PFAS), phthalates, and heavy metals such as cadmium, lead, and mercury.

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'Forever chemicals' surge past federal limits in some Missouri water systems

New Tribune · 28 Mar 2026

At least five Missouri water districts reported levels of "forever chemicals" above federal limits, according to Environmental Protection Agency data. One Missouri city has contamination levels nearly three times the federal limit.

The chemicals, scientifically known as per- and polyfluoroalkyl substances, or PFAS, are in hundreds of household items including cookware, carpeting, clothing, cosmetics, electronics and packaging. They also are a popular type of chemical firefighting foam heavily used on military bases.

The chemicals have been tied to health issues such as thyroid disease, cancer risks, decreased fertility, reduced immune function and interference with hormonal function.

Because of their unique bonds, they take an incredible amount of time to break down. They even break down into other PFAS, like perfluorooctanoic acid (PFOA) or perfluorooctane sulfonate (PFOS), as they deteriorate, which leeches the forever chemicals into landfills, groundwater and wastewater systems across the country.

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Avalanche risks move to the forefront as workplace hazard

Canadian Occupational Safety · 27 Mar 2026

“Many, many workers can be exposed”

Avalanche risk extends far beyond ski guides and patrollers, Kidd stresses. Workers can be exposed while travelling or working in mountainous or steep terrain in a range of industries, from forestry and construction to utilities, transportation and tourism. “Many, many workers can be exposed to avalanche, sometimes even traveling from job to job,” he says.

“Employers, they play a critical role” in making sure those workers are safe in avalanche-prone environments, he adds. That responsibility includes identifying where workers may be exposed, arranging for a risk assessment by a qualified person, and putting a written safety plan in place before work goes ahead.

That plan should be backed by appropriate training, the right safety and rescue equipment, and clear safe work procedures that are actively supervised in the field. Employers must also “ensure conditions are continuously monitored, workers are properly trained, supervised, and informed, and that work is postponed or stopped when conditions are unsafe.”

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Colorado Moves to Regulate Cancer-Causing Air Toxins

National Today · 28 Mar 2026

State regulators propose new rules to cut emissions of industrial chemicals linked to serious illnesses

Colorado's Air Quality Control Commission is set to hold a three-day public hearing from April 15-17, 2026 to consider a sweeping package of new rules aimed at reducing emissions of five priority toxic air contaminants: benzene, ethylene oxide, formaldehyde, hexavalent chromium, and hydrogen sulfide. The proposed Regulation 30 rules would establish health-based standards and impose specific pollution controls on sources ranging from large refineries to smaller manufacturers, with the goal of protecting communities that have long borne the brunt of toxic air pollution.

Why it matters

State studies and local activists say certain lower-income neighborhoods in the Denver area face higher lifetime cancer risks due to exposure to these industrial chemicals. The new rules are designed to carry out a 2022 law requiring the state to identify and regulate priority toxic air contaminants, addressing long-standing community concerns about the health impacts of pollution from sources like the Suncor refinery in Commerce City.

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Public health experts call for stricter glyphosate regulation

c&en · 31 Mar 2026

After a University of Washington symposium, a group of 17 leading researchers and advocates cite ‘compelling evidence’ that glyphosate can cause cancer

A group of 17 leading public health researchers and advocates from the US, Canada, and Europe are calling on regulators around the world to treat the widely used herbicide glyphosate as hazardous and limit or eliminate its use to protect public health.

The recommendations are in a statement released March 27, after a 2-day research symposium on glyphosate and health held at the University of Washington (UW). The event had about 200 participants, in person and online, from the fields of exposure science, epidemiology, toxicology, statistics, law, and advocacy.

More broadly, the authors of the statement call for “pesticide approval decisions based on a more comprehensive and unbiased suite of health effects data,” and for those data to come from testing conducted by laboratories and organizations independent of the pesticide industry. They also call for regulators to publicly release all scientific evidence used in pesticide evaluations.

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EUROPE

UK HSE, 27-03-26

Communications Sustainability · 17 Mar 2026

Air pollution and greenspace exposure disparities revealed by hyperlocal exposure metrics across European cities

Efforts to map disparities in environmental exposure burdens across populations in varying urban settings are extremely limited. Here, we analyzed disparities in exposure to nitrogen dioxide air pollution and urban greenspaces in Dublin, Copenhagen, and Amsterdam, using hyperlocal environmental metrics derived from large-scale digital datasets. In Dublin, racial/ethnic minority groups were exposed to higher levels of nitrogen dioxide and lower levels of greenspace. Furthermore, immigrant populations were exposed to more pollution and less greenspace than natives in Dublin and Copenhagen, whereas the opposite trend was observed in Amsterdam. However, when considering population wealth, inhabitants of low-income areas were exposed to greater levels of greenspace and lower levels of nitrogen dioxide in all cities. These findings demonstrate that population environmental exposures are inconsistent across cities. Our results emphasize the need for city-specific studies of exposure burdens utilizing hyperlocal data to inform the design of sustainable, healthy, and equitable cities of the future.

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HAZARD ALERT

Carbon Tetrachloride

10 Apr 2026

Carbon tetrachloride is an inorganic compound with the formula CCl4.[1] It is a clear liquid with a sweet odour that evaporates very easily. Carbon tetrachloride does not easily burn and is almost insoluble in water. It is a manufactured chemical and does not occur naturally in the environment. [2,3]

Uses [2]

Carbon tetrachloride has been produced in large quantities to make refrigeration fluid and propellants for aerosol cans. Since many refrigerants and aerosol propellants have been found to affect the earth's ozone layer, the production of these chemicals is being phased out. Consequently, the manufacture and use of carbon tetrachloride has declined a great deal. In the past, carbon tetrachloride was widely used as a cleaning fluid (in industry and dry cleaning establishments as a degreasing agent, and in households as a spot remover for clothing, furniture, and carpeting). Carbon tetrachloride was also used in fire extinguishers and as a fumigant to kill insects in grain. Most of these uses were discontinued in the mid-1960s. Until recently, carbon tetrachloride was used as a pesticide, but this was stopped in 1986.

In the Environment [2]

As carbon tetrachloride evaporates easily, most of the compound released to the environment during its production and use reaches the air, where it is found mainly as a gas. It can remain in air for several years before it is broken down to other chemicals. Small amounts of carbon tetrachloride are found in surface water. Because it evaporates easily, much of it will move from surface water to the air within a few days or weeks. However, it may be trapped in groundwater for longer periods. Carbon tetrachloride is not expected to stick to soil particles. If spilled onto the ground, much of it will evaporate to the air. Some of it may also go into groundwater, where it can remain for months before it is broken down to other chemicals. It is not expected to build up in fish. It is unknown whether it builds up in plants.

Sources and Routes of Exposure [4]

Sources of Exposure

General Populations

- Carbon tetrachloride is found in air, water and soil. Inhalation of contaminated air and ingestion of contaminated drinking water are the primary routes of exposure.

- The general public is not likely to be exposed to large amounts of carbon tetrachloride. Populations living close to waste sites or areas of heavy carbon tetrachloride use may have increased risk of exposure.
- Exposure may occur through volatisation of carbon tetrachloride from tap water during showering, bathing or cooking.
- Carbon tetrachloride is currently banned from use in commercial products.

Occupational Populations

- Inhalation of contaminated air is the primary route of exposure in occupational settings.
- Workers involved in the manufacture of carbon tetrachloride are most likely to be exposed than the general public.

Routes of Exposure

- Inhalation – Predominant route of exposure for general population.
- Oral – Major route of exposure for the general population through ingestion of contaminated drinking water.
- Dermal – Minor route of exposure through dermal contact with contaminated soil.

Health Effects [3]

Acute Effects

- Acute inhalation and oral exposures to high levels of carbon tetrachloride have been observed primarily to damage the liver (swollen, tender liver, changes in enzyme levels, and jaundice) and kidneys (nephritis, nephrosis, proteinurea) of humans. Depression of the central nervous system has also been reported. Symptoms of acute exposure in humans include headache, weakness, lethargy, nausea, and vomiting.
- Delayed pulmonary oedema (fluid in lungs) has been observed in humans exposed to high levels of carbon tetrachloride by inhalation and ingestion, but this is believed to be due to injury to the kidney rather than direct action of carbon tetrachloride on the lung.
- Acute animal exposure tests in rats, mice, rabbits, and guinea pigs have demonstrated carbon tetrachloride to have low toxicity from inhalation exposure, low-to-moderate toxicity from ingestion, and moderate toxicity from dermal exposure.

Chronic Effects (Noncancer)

- Chronic inhalation or oral exposure to carbon tetrachloride produces liver and kidney damage in humans and animals.
- EPA has not established a Reference Concentration (RfC) for carbon tetrachloride.
- The California Environmental Protection Agency (CalEPA) has established a chronic reference exposure level of 0.04 milligrams per cubic metre (mg/m3) for carbon tetrachloride based on liver effects in guinea pigs.
- ATSDR has established an acute duration (1-14 days) inhalation minimal risk level (MRL) of 1.3 mg/m3 (0.2 parts per million [ppm]) based on liver effects in rats, and an intermediate duration (14-365 days) MRL of 0.3 mg/m3 (0.05 ppm) also based on liver effects in rats.
- The Reference Dose (RfD) for carbon tetrachloride is 0.0007 milligrams per kilogram per day (mg/kg/d) based on the occurrence of liver lesions in rats.

Reproductive/Developmental Effects

- No information is available on the reproductive effects of carbon tetrachloride in humans. Limited epidemiological data have indicated a possible association between certain birth outcomes (e.g., birth weight, cleft palate) and drinking water exposure. However, as the water contained multiple chemicals, the role of carbon tetrachloride is unclear.
- Decreased fertility and degenerative changes in the testes have been observed in animals exposed to carbon tetrachloride by inhalation.
- Birth defects have not been observed in animals exposed to carbon tetrachloride by inhalation or ingestion.

Cancer Risk

- Occasional reports have noted the occurrence of liver cancer in workers who had been exposed to carbon tetrachloride by inhalation exposure; however, the data are not sufficient to establish a cause-and-effect relationship.
- Liver tumours have developed in rats and mice exposed to carbon tetrachloride by gavage (experimentally placing the chemical in their stomachs).
- EPA has classified carbon tetrachloride as a Group B2, probable human carcinogen.

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. 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 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. 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.

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 carbon tetrachloride:

- 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

United States [6]

EPA: The Environmental Protection Agency has set a limit for carbon tetrachloride in drinking water of 5 parts of carbon tetrachloride per billion parts of water (5 ppb). The EPA has also set limits on how much carbon tetrachloride can be released from an industrial plant into waste water and is preparing to set limits on how much carbon tetrachloride can escape from an industrial plant into outside air.

OSHA: The United State Occupational Safety & Health Administration has set the following Permissible Exposure Limits (PEL):

- General Industry: 29 CFR 1910.1000 Z-2 Table -- 10 ppm TWA; 25 ppm Ceiling for 5 minutes in any 3 hours; 200 ppm Peak
- Construction Industry: 29 CFR 1926.55 Appendix A -- 10 ppm, 65 mg/m3 TWA; Skin
- Maritime: 29 CFR 1915.1000 Table Z-Shipyards -- 10 ppm, 65 mg/m3 TWA; Skin

ACGIH: The American Conference of Governmental Industrial Hygienists has set a Threshold Limit Value (TLV) for carbon tetrachloride is 5 ppm, 31 mg/m3 TWA; 10 ppm, 63 mg/m3 STEL; Skin; Appendix A2 - Suspected Human Carcinogen

NIOSH: The National Institute for Occupational Safety and Health has established a Recommended Exposure Limit (REL) for carbon tetrachloride of 2 ppm, 12.6 mg/m3 STEL (60 Minutes); Appendix A - NIOSH Potential Occupational Carcinogens

Australia [7]

Safe Work Australia: Safe Work Australia has established a Time Weighted Average Concentration (TWA) for carbon tetrachloride of 0.1ppm/ 0.63mg/m3 for a 40-hour workweek.

References

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- http://www.safeworkaustralia.gov.au/sites/swa/about/Publications/Documents/772/Workplace-exposure-standards-for-airborne-contaminants.docx

JANET'S CORNER

Who Am I?

10 Apr 2026

I am the pungent ghost that haunts industrial landscapes, born when hydrogen bows to nitrogen under crushing pressure and scorching heat.

My alkaline bite makes me invaluable in refrigeration systems, yet my sharp odor warns of danger before chemistry turns treacherous.

I am the lifeblood of agriculture, transformed into fertilizers that feed billions, though my production consumes nearly 2% of global energy.

My formula is NH_3, and you know me by my suffocating smell—I'm the colorless gas that cleans your windows, cools your food, and grows your crops.