Helium Find Thaws the Cold Fusion Trail

An unpublished finding that cold fusion experiments apparently created helium has rekindled debate about the still-unexplained and controversial phenomenon.

Two years ago, reports of nuclear reactions occurring at room temperature sparked scientific furor over the validity of the results and the ideas behind the findings, some of which could not be replicated and hinted at sloppy science (SN: 4/1/89, p.196; 4/8/90, p.212). Many researchers, the federal government and the public eventually became disenchanted, writing off the cold fusion phenomenon as a boondoggle best buried in the literature.

But not everyone gave up. And now, Navy and academic chemists say their results add weight to the claim that cold fusion can occur. In an article accepted last month for publication this spring in the JOURNAL OF ELECTROANALYTICAL CHEMISTRY AND INTERFACIAL ELECTROCHEMISTRY, the investigators report that they detected helium in gases released during cold fusion reactions. Experts have long sought to verify helium release because it is one possible product of cold fusion.

B.F. Bush and J.J. Lagowski of the University of Texas in Austin and Melvin H. Miles and G.S. Ostrom of the Naval Weapons Center in China Lake, Calif., say the helium levels they measured correlate roughly with the amount of heat generated by the fusion reaction.

"I would call this the most startling finding since that first announcement [of cold fusion] by Pons and Fleischmann," says Fritz Will, director of the National Cold Fusion Institute at the University of Utah in Salt Lake City. "If this stands up, it will be revolutionary."

Fusion occurs when the nuclei of two light atoms, such as hydrogen, merge to form a single heavy nucleus and release lots of energy – the same kind of energy that powers thermonuclear weapons and makes the sun shine. For their experiments, Bush and his co-workers ran an electrical current through heavy water containing a palladium rod. The flow of current causes the water to break into its hydrogen isotope and oxygen components. The hydrogen isotope, called deuterium, collects at the palladium electrode and compresses into the rod's crystal lattice structure. And there cold fusion supposedly occurs.

Skeptics argue that proof of fusion requires two pieces of evidence: excess heat and some fusion product. Too often, they say, such "products" turn out to be contaminants. For example, the helium that exists in air and other substances has thus far confounded researchers' efforts to show that cold fusion experiments have produced helium.

But Bush and Miles say they designed their experiment to prevent any contamination. This design, as well as control tests, makes them confident that the experiment generated the gas and that their results proved fusion occurred, they say. To detect the the helium, they used a sensitive analytical technique called mass spectrometry. "The results are rock solid," says Bush, who has studied air-sensitive materials for almost a decade and who now works at the Naval Weapons Center. "When excess heat was observed, helium was present. When there was no excess heat, helium was not present."

Those who believe in cold fusion are quite excited. "It's a world-turning experiment, a lollapalooza," says John O'M. Bockris, a physical chemist who has researched cold fusion at Texas A&M University in College Station.

Metallurgist Nathan J. Hoffman cautions, however, that the presence of helium doesn't necessarily guarantee that fusion has occurred. Helium can diffuse through glass or be trapped during rod formation and then released as the palladium cracks during or after exposure to electrical currents, says Hoffman, a cold fusion investigator at the Energy Department's Energy Technology Engineering Center in Canoga Park, Calif. But he adds: "The experiments they are doing are what needs to be done."

Other scientists question different aspects of the work. "It just violates all that we know about nuclear physics," says John R. Huizenga, a nuclear chemist at the University of Rochester in New York. He says the reported reaction produced too much heat for the amount of helium detected. "You have to have some sort of miracle to get that," Huizenga contends.

Then, too, according to accepted nuclear theory, fusion should yield one or a combination of three pairs of products: a helium isotope and neutrons, tritium and protons, and helium and gamma rays. Huizenga criticizes the new work because the scientists did not try to measure the release of gamma rays. In addition, he says, fusion usually generates much more of the first two pairs of products than of helium, yet the investigators detected no helium isotope. "When you have a pyramid of surprises, you have to wonder," he told SCIENCE NEWS.

On the other hand, a few theoreticians have suggested that cold fusion does not follow accepted fusion theory and that its major product could be helium, Will says. Miles says that dental film placed near the experimental apparatus was exposed during the reaction, possibly indicating the presence of gamma rays.

The researchers say they did everything they could to ensure the validity of their results. Bush built a two-stage activated charcoal cryofilter to remove deuterium and all other gases except helium, and did six control experiments with regular water after the team detected helium in experiments with deuterium. "They [other scientists] should be able to reproduce this work if they are careful enough," he says. "But the effluent gas has to be handled perfectly."

Hoffman agrees that the experimenters' approach is sound. He suggests, however, that the researchers reverse the order of the tests, using the heavy water after the regular water, and make sure all other conditions are the same. This reordering would eliminate the possibility that cracking of the rod – caused by shutting down the reaction – had released all the trapped helium so that none remained when they did the control experiments. *– E. Pennisi*

Alzheimer's drug fails panel review

Despite some favorable testimony, an advisory panel has decided against recommending that the FDA approve the marketing of an experimental Alzheimer's drug. In announcing its conclusion last week, the panel cited a lack of convincing scientific evidence demonstrating the efficacy and safety of the drug, known as tetrahydroaminoacridine (THA). The decision means the compound's manufacturer, Warner-Lambert Co., must gather additional data before it can win FDA approval of the controversial drug to treat a disease for which no drug therapy now exists.

This isn't the first time questions about THA have surfaced. Psychiatrist William K. Summers of Arcadia, Calif., launched the THA saga in November 1986 with a report of dramatic improvement in 12 Alzheimer's patients who had taken the drug for about a year. Although researchers hailed THA as a major treatment breakthrough at the time, a subsequent FDA probe revealed serious flaws in the study (SN: 2/2/91, p.70).

Now, two new studies – one conducted by U.S. researchers and the other by British scientists – add mixed results to the growing file on THA.

Officials at Warner-Lambert, which helped sponsor the trials, presented unpublished results from those studies at