"Then the whole industry got interested."

At issue is whether Mobil's ZSM-5 and Union Carbide's silicalite are different or essentially the same material. Both are synthetic zeolites. Mobil's ZSM-5 is defined as an aluminosilicate, whereas Union Carbide's silicalite is made with silicates but without aluminum. Mobil's assertion that its patents are being infringed rests on the allegation that Union Carbide's silicalite contains aluminum and thus is indistinguishable from ZSM-5. Union Carbide vigorously denies this allegation. Silicalite is "essentially a silica polymorph, with no aluminum in it," asserts Union Carbide attorney H. M. Humphreys.

Union Carbide scientists have maintained that silicalite is free of aluminum, except for trace contamination. This contention is based partly on x-ray diffraction pattern analysis, which traditionally has been the standard technique for analyzing zeolite structure and composition.

However, in 1982 a team of chemists from the University of Guelph in Canada and the University of Cambridge in England published their analysis of several zeolites based on the technique of magic-angle-spinning nuclear magnetic resonance (NMR). They found that, contrary to Union Carbide's claims, silicalite contains more than trace amounts of aluminum. Moreover, even when present in slight amounts, the aluminum forms an integral part of the zeolite's structure. This finding has since been repeated and published in several papers.

"We have recently developed techniques to remove aluminum very efficiently from zeolites," Colin Fyfe, one of the University of Guelph chemists, told *Science*. Fyfe, who has been asked by Mobil to serve as a witness when the Union Carbide lawsuit comes to trial, says that this refined technique makes the NMR data "more meaningful." Removing most of the aluminum from a sample of ZSM-5 "transforms" it into silicalite, he asserts. "The aluminum [NMR spectral] signal stays in the same position, which suggests it [the aluminum] is in the structure. My belief is the structures [of the Mobil and Union Carbide products] are the same."

Some scientists assert that the presence of aluminum or similar metallic elements is, besides being integral to the structure, also essential for catalytic activity of the zeolites. "Aluminum is present everywhere as an impurity," points out one industry scientist whose company is not directly involved in the current lawsuits. He says that Union Carbide scientists have argued that avoiding aluminum in silicalite is practically impossible because it is present "in all reactants." But winning this argument may not win the lawsuit for Union Carbide, he says. "I personally think that catalytic activity is proportional to the aluminum in the structure." Adds a university researcher recalling conversations with industry colleagues who have firsthand experience, "I think the [aluminum-free] zeolite is a dud as a catalyst."

In spite of this assertion, Mobil has been trying to extend its aluminosilicate line of zeolites toward the aluminum-free end of the product spectrum. Company scientists have patented an extensive series of zeolite compounds having very low levels of aluminum. The company also has had the patent office reissue an earlier document claiming, for Mobil, metal organosilicates "essentially free of group IIIA metals," such as aluminum. Although Union Carbide scientists hold several patents for zeolites, a company attorney says there is "no enforceable U.S. patent" for silicalite. But that fact "has no bearing . . . Union Carbide wants the court to look at the [Mobil] patents and our silicalite product and see that our sieve does not infringe on any valid claims of the patents."

The dispute between Mobil and Amoco sounds similar but is built around another chemical element—boron. Amoco's Marvin Klotz has obtained several U.S. patents during the past few years covering boron-containing zeolites. He and his associate Stephen Ely carefully distinguished their "crystalline borosilicate" from particular Mobil zeolites, which they describe as "synthetic crystalline aluminosilicates containing a minor amount of boria. . . ." Mobil claims that its chemists hold earlier patents than Amoco's, and thus it, rather than Amoco, is entitled to the exclusive use of boron-containing zeolites.

Amoco insists that its borosilicate molecular sieve material contains boron in its molecular framework and is thus distinct from Mobil's catalysts. Industry observers say that the presence of boron in particular formulations of zeolites is "important for catalytic activity" and that it gives "advantages when it comes to selectivity." Thus Amoco seems to be on solid scientific footing in claiming that its scientists "discovered an original, proprietary xylene isomerization catalyst." However, the company's crucial assertion that use of this catalyst "does not use any Mobil technical information or fall within any Mobil patent rights" has become a matter for the court to decide.—**JEFFREY L. FOX**

Two Chilean Professors Released

Word has come from Chile that two of the three mathematics professors seized by the government in November have been released unharmed (*Science*, 21 December 1984, p. 1405). The third, Douglas Fuente, is being held in a detention center.

The seizures were among thousands of arrests and detentions that have been occurring in the wake of nationwide antigovernment demonstrations in September.

The sources in Chile reportedly attribute the release of the two professors at least in part to the surge of telegrams sent to Chile's military-run government by professional societies in the United States, Canada, France, Argentina, and Brazil.

—**CONSTANCE HOLDEN**

Scientific Boycott Proposed to Aid Refusenik

Four American and British microbiologists have called on their colleagues to stop sending bacterial strains to Soviet scientists as a protest over the stalled emigration plans of molecular geneticist David Goldfarb.

Goldfarb was planning to leave Moscow last April when the KGB stepped in, confiscated his strains, and blocked his visa (*Science*, 11 May 1984, p. 582).

Now Max Gottesman of the National Cancer Institute and Charles Yanofsky of Stanford University have sent letters to American biologists through the Committee of Concerned Scientists in which they propose a moratorium on sending strains to the Soviet Union until Goldfarb is allowed to leave. A similar initiative has been taken by Michael Yudkin of the University of Oxford and Simon Baumberg of the University of Leeds.

Goldfarb is being detained for "security" reasons although he says he never worked with secret material. Formerly the director of the Laboratory of Molecular Genetics of Bacteria and Bacteriophages in Moscow, he obtained some of his original strains from the United States, including

Escherichia coli auxotrophs from Yanofsky's laboratory.

Goldfarb's son Alexander, who teaches at Columbia University, says the moratorium idea—first put forth by Nobel laureate Joshua Lederberg—is a controversial one. But he believes this suspension of scientific courtesy could significantly hamper the work of Russian microbiologists and therefore make an impression on Soviet authorities.—**Constance Holden**

VA Re-reconsiders Twin Study

The House Veterans Affairs Committee has persuaded the Veterans Administration to delay action on a twin study of Vietnam veterans pending a review by the Office of Technology Assessment. The $9-million project at the St. Louis VA Medical Center was originally designed as another Agent Orange study, but its primary contribution was expected to be valuable information on the long-term psychological effects of Vietnam service (*Science*, 2 November 1984, p. 521). Although the plan had been thoroughly vetted, the VA re-reviewed it last summer and decided it was of "questionable scientific worth." A spokesman for the veterans committee chairman, G. V. (Sonny) Montgomery (D–Miss.) told the Washington *Post* he wanted to know "why the VA suddenly wants to end a study that it has claimed for 2 years is of some importance."—**Constance Holden**

Psychologist's Suit Dismissed

Psychologist David Campbell, junior developer of the Strong-Campbell vocational interest inventory, has lost his bid to prevent the test's owner, Stanford University, from transferring its management to a private firm, Consulting Psychologists Press, Inc.

Campbell gave up his scientific rights over the inventory in 1974 but he claimed in a lawsuit that his rights under a 1966 contract were violated because Stanford did not ask his consent for the transfer.

But a California district court judge dismissed the suit, saying Stanford's action did not depart from "established practice" as Campbell alleged, and that Stanford did not transfer its "interest" in the inventory since it still owns the copyrights.

The judge, however, expressed sympathy with Campbell's concerns about a nonacademic entity taking over development of the inventory. "This outcome might have been different if [the] plaintiff . . . alleged a breach of . . . good faith and fair dealing," he wrote.—**Constance Holden**

Three Sites Short-Listed for Nuclear Waste Dump

The Department of Energy has tentatively short-listed three sites as prime candidates for a permanent nuclear waste repository. They are Deaf Smith County in the Texas panhandle, Yucca Mountain in southwestern Nevada close to the nuclear test site, and the Hanford nuclear reservation near Richland in Washington. Sites in Utah and Mississippi have been selected as possible backups.

The department is expected to make the shortlist final later this year, after people in the affected areas have had a chance to review vast amounts of environmental data collected from a preliminary analysis of the sites.

The announcement of the shortlist is just one step in a long process aimed at getting a repository into operation by 1998. Once the shortlist is finalized, an exhaustive geological survey will be conducted at each site, including sinking test shafts as deep as 4000 feet. Between $500 million and $1 billion will be spent on each survey.

The department hopes to select one of the three sites for the repository in 1990. At that point the lucky (or unlucky) state can exercise a veto, which could only be overriden by a vote of Congress.

The political uncertainties in the selection process are at least as formidable as the geological uncertainties. Energy Secretary Donald P. Hodel acknowledged last week that "right now, we would have to say none of the states is supportive."

—**Colin Norman**

AID Turns Down IPPF

In keeping with the Administration's new international antiabortion policy, the Agency for International Development (AID) has turned down a request for $17 million by the International Planned Parenthood Federation (IPPF).

The action has dismayed population groups. "Everyone was expecting a compromise," says an official of the Population Crisis Committee.

The IPPF, which received $13 million—25 percent of its budget—from AID for 1984, had reportedly been trying to get word about its prospects for 1985 since September. Finally this month AID administrator Peter McPherson notified IPPF that no money would be forthcoming.

The Administration's policy statement indicated that money withheld from groups that "promote" abortion could be delivered to alternative family planning organizations, but AID has given no indication of what these organizations might be.

—**Constance Holden**

Comings and Goings

Spurgeon M. Keeny, Jr., a national security expert who is presently a scholar in residence at the National Academy of Sciences, has been appointed executive director of the Arms Control Association, a nonprofit educational group in Washington. Previously, Keeny has been an Air Force intelligence officer, a staff member of the National Security Council, an executive at the Mitre Corporation, and a deputy director of the Arms Control and Disarmament Agency. He replaces William Kincade, who will continue as a senior associate at the Carnegie Endowment for International Peace in Washington.

Walter Gilbert has resigned as chairman and chief executive officer of Biogen. A Nobel prizewinner, Gilbert surprised many colleagues when he left Harvard University 3 years ago to run the company full time. No official reason was given for his departure. Gilbert, who went sailing in Polynesia after submitting his resignation, could not be reached for comment.