

tivity limits and detection of undesirable environmental constituents at concentration levels far below known or expected levels of toxicity.

"In the next two decades," the executive summary of the report says in conclusion, "there will be dramatic changes in our basic understanding of chemical change and in our ability to marshal that understanding to accomplish a deliberate purpose. The program presented here defines a leadership role for the United States as these advances are achieved."

Three audiences. Like other major reports on science fields or subfields, the Pimentel report had to strike some delicate balances among politicians, administrators and working scientists. The trick in such reports is to be effective without appearing too aggressive, to be helpful without appearing to tell people how to do their jobs, and to be exciting without offending scientists working in other areas.

The committee and task forces that designed and wrote the Pimentel report elected to produce a relatively concise document that would stand a chance of getting the attention of politicians and political aides but not strike officials and scientists as incomplete or biased. The report is barely more than 300 pages long, it contains numerous illustrations, tables and graphs, colored pages draw attention to exceptionally exciting stories about work in chemistry and the executive summary highlights its strong recommendations in colored type. The recommendations are backed by a persuasive introductory section outlining "societal benefits from chemistry" and "intellectual frontiers in chemistry."

Written before Congress enacted the Gramm-Rudman budget-cutting plan, the Pimentel report appears to have been predicated on the proposition that chemistry would do well to push hard for funds at a time when the nation's political leadership is known to be favorably disposed toward hard scientific research and especially research with visible economic payoffs.

The last time a comprehensive report on US chemistry was done, 20 years ago, a committee headed by Frank H. Westheimer of Harvard University called for annual increases in funding for university-based research in chemistry of 20% or 25%. *Chemical and Engineering News* has noted the similarity between the Pimentel and Westheimer recommendations, and it has quoted Westheimer as saying that "in retrospect it seems that we asked for too much."

The Pimentel committee has been credited in some quarters with having helped get the Reagan Administration to put sizable increases for chemistry into its 1987 budget request. The

increases for chemistry are larger than for physics, but physicists can take solace in the reflection that much of the work endorsed by the Pimentel committee takes sustenance from physics and in turn nourishes physics.

Physical chemistry. The Pimentel report is divided into three major sections: chemical reactions, molecular complexity and the contributions of chemistry to national welfare. Fully one-third of the report, the opening section on the control of chemical reactions, deals very largely with physical chemistry.

The section covers much the same topics contained in the chapter on physical chemistry in the Brinkman volume about "interfaces" between physics and other fields, which was prepared by an independent panel. The chemistry panel covered laser chemistry, surface science, neutron and x-ray techniques, polymers and complex fluids, and electrically conducting organic materials. The Pimentel report also stresses the chemistry of materials under extreme conditions, a topic treated elsewhere in the physics report.

In contrast to the Brinkman panel's chapter on physical chemistry, which emphasizes the need for more interdisciplinary teaching and research, in

both universities and special research centers, the Pimentel report puts the priority on more funding for instruments. "About 80% or 90% of the instrumentation needed is based on physics or physics techniques," observes Fred W. McLafferty of Cornell University, a member of the Pimentel task force on physical chemistry.

Harry G. Drickamer, another member of the task force, also stresses the strong convergence of physics and chemistry seen in the last 20 years. Drickamer, a chemist at the University of Illinois, Urbana-Champaign, observes that chemists have become much more interested in solid-state science, which was not mentioned at all in the Westheimer report two decades ago, and condensed-matter science, which was hardly mentioned.

In all, despite great differences in style and some differences in thrust, the Pimentel committee appears to have adopted recommendations for physical chemistry that are complementary to the thoughts formulated by the Brinkman group on interfaces (see page 46). The two teams are in full agreement that, as the Brinkman group put it, "the interdisciplinary associations have begun to reach more deeply into both fields."

—WILLIAM SWEET

Washington Ins and Outs:

Fletcher to head NASA again

President Reagan selected James C. Fletcher to serve a second tour of duty as NASA administrator in the wake of the 28 January explosion of the Challenger space shuttle, in which seven astronauts lost their lives. Fletcher held the job previously between 1971 and 1977.

As head of NASA during that period, Fletcher approved the final design of the space shuttle, including the solid-fuel rocket boosters that are the focus of investigations into the tragedy. An authorized NASA history, *Orders of Magnitude*, says Fletcher considered the original design for the shuttle too costly to win Congressional approval and advocated a scaled-down version that "cut the cost in half, mainly by dropping the plan for unassisted take-off and substituting two external, recoverable, reusable solid rockets and an expendable external fuel tank. This proved to be saleable." The \$5 billion estimate for the first downsized shuttle was way off target. The actual cost of designing, developing, building and testing it came to about \$23 billion.

Fletcher, now a consulting engineer and professor of engineering and technology at the University of Pittsburgh, was asked by the White House about

returning to NASA after the resignation on 25 February of James M. Beggs. Beggs had taken an unpaid leave as administrator when he was indicted on fraud charges in connection with a Defense Department contract that he oversaw as executive vice-president at General Dynamics (PHYSICS TODAY, January, page 55). Virtually until he was nominated on 6 March, Fletcher insisted repeatedly that he didn't want the NASA job and would "have to be dragged kicking and screaming" to accept it. He argued that he would be making "a financial sacrifice" because he would need to give up board memberships at six corporations, including Burroughs and Standard Oil of Indiana. He also would be required to remove himself as a consultant to the Strategic Defense Initiative, for which he headed the first study on technical feasibility in 1983-84, and step down as chairman of a safety advisory board supervising the cleanup of the damaged nuclear reactor at Three Mile Island.

Fletcher earned a PhD in physics from Caltech and taught there, at Princeton and at UCLA during and after World War II. He was president of the University of Utah from 1964 to 1971. □