

Chemical Sciences in the FY 2002 Budget

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Chemistry is a central science that is essential to the missions of the federal agencies and the nation's economic growth. Not every federal agency has a program devoted to funding chemical science, but funding for chemistry is found throughout government programs. In the current FY 2002 budget proposal:

- Chemistry would benefit from the proposed increase for the National Institutes of Health (NIH).
- Based on preliminary figures for the Department of Defense (DOD), chemical sciences research could increase.
- In the remaining federal agencies, total support for research in the chemical sciences would decline.

Scientists in academia and government laboratories perform federally funded chemistry research. Additionally, the nation's industries obtain research results that are advancing commercial applications by using the unique equipment and novel methods at national user facilities. Partnerships between these three sectors, leveraged with industrial funding, transfers research results into new technology and products.

Chemical research leads to a wide range of products and services that make our lives better, safer, healthier, and more efficient. Federal research funding has fueled these accomplishments—catalysts that make better plastics, critical materials for electronics, enhanced energy production, greener manufacturing processes, new pharmaceuticals, and

improved pollutant detection, treatment, and prevention. New and innovative contributions from the chemical sciences will emerge given sufficient resources to invest in promising research ideas.

NATIONAL SCIENCE FOUNDATION (NSF)

The NSF provides nearly a third of total federal support for research in the chemical sciences. Within NSF, the Chemistry Division supports approximately one-half of the Foundation's chemistry research. Support for chemistry research is also found in Materials Research, the Molecular and Cellular Biosciences, and the Atmospheric Sciences Divisions.

Under the proposed FY 2002 budget, research project support from the Chemistry Division would stay at last year's level of \$153 million (see Table II-7). Within this flat budget, almost all of the funding would support research in the NSF priority areas of Information Technology Research, Nanoscale Science and Engineering, and Biocomplexity in the Environment, as well as Chemistry Centers. Consequently, the Chemistry Division may lose the flexibility to fund research that falls outside of these priorities.

Chemistry would generally benefit from the requested increase in stipends for graduate research and teaching fellowships and traineeships. In addition, the proposed Math and Science Partnerships Initiative would benefit the chemical sciences. (For more information on NSF, please see Chapter 7.)

NATIONAL INSTITUTES OF HEALTH (NIH)

As the principal supporter of biomedical research in the United States, NIH is a significant source of new biomedical discoveries that are leading to longer, healthier lives as well as reduced health-care costs. The chemical sciences play a critical enabling role in these efforts.

Increasingly, the ability to respond to new health challenges, such as AIDS and drug-resistant tuberculosis, and to combat enduring afflictions such as Alzheimer's disease, relies on an understanding of human and disease systems at molecular and chemical levels. Much of this understanding comes from investigations in basic chemical and biological

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phenomena supported by the National Institute of General Medical Sciences (NIGMS) and the National Center for Research Resources (NCRR).

NIGMS provides non-disease-specific basic research and training that complements advances in other NIH institutes. NIGMS traditionally provides approximately two-thirds of NIH's support for academic research in chemistry and one-third of its support in biochemistry. The Administration's request would give NIGMS an 11.7 percent increase to \$1.7 billion (see Table II-9). Initiatives funded in the FY 2002 budget include Chemical Methodologies and Library Development, and Metals in Medicine.

The 19.2 percent increase to \$974 million proposed for NCRR would support the state-of-the-art research infrastructure necessary for high quality biomedical research. Of particular importance to chemical researchers is the Shared Instrumentation Grants (SIG) program (\$49 million in FY 2002). The chemical community is concerned that proposed cuts to NSF's instrumentation program (from \$75 million down to \$50 million) may put pressure on SIG's success rate. (For more information on NIH, please see Chapter 8.)

DEPARTMENT OF ENERGY (DOE)

DOE supports fundamental research in the chemical sciences that improves the cost effectiveness and environmental impact of the production and consumption of energy and energy-related products. Most chemistry research at DOE is supported through the Office of Science's programs in Basic Energy Sciences (BES) and Biological and Environmental Research (BER).

In the FY 2002 proposal, BES would receive a minimal increase of 1.3 percent to \$1.0 billion to fund the Spallation Neutron Source and Nanoscale Science Research Centers, which indirectly benefit chemistry (see Table II-11). In BER, the proposed budget would increase the Genomes to Life program by \$9.9 million, benefiting some chemistry subfields. In both BER and BES, reduced support for chemistry research grants may be detrimental, especially in areas such as catalysis, which is closely linked to U.S. economic growth.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST, through its intramural and extramural programs, delivers the underlying technological capabilities for areas of chemical processing and research, from nanotrace analyses and clinical testing to synthesis and catalysis. Researchers at NIST's Chemical Science and Technology Laboratory focus, in part, on the research and technology needs of the U.S. chemical industry.

NIST laboratories provide impartial expertise, test methods, and best-in-the-world calibration services needed for a variety of industrial sectors, including chemicals, electronics, automotive, aerospace, food processing, and health care. In addition, the laboratories produce standard reference materials and data needed by industry to advance new areas such as nanotechnology. In FY 2002, the 11.6 percent increase to \$337 million for the intramural laboratory program would address the past decline in these laboratories.

The Administration's decision to suspend funding for new Advanced Technology Program (ATP) grants could be detrimental to research that strengthens U.S. industries in high-risk technologies with a potential for broad economic impact. In the past, ATP projects that capitalize on advances in chemistry have spanned many areas, including separation technology, DNA diagnostics, and selective membrane and process technologies. (For more on NIST, please see Chapter 12.)

DEPARTMENT OF DEFENSE (DOD)

DOD supports military-relevant basic research in the chemical sciences through research offices of the Air Force, Army, and Navy. Basic research funding, referred to as "6.1," is allocated for both intramural and extramural research, the latter conducted primarily at universities. Historically, DOD was one of the major supporters of physical chemistry. However, the decline in DOD's R&D budget over the past decade has significantly decreased the available support for physical chemistry.

As of press time, the Administration has released only placeholder figures for FY 2002 DOD research programs, which show a proposed increase at the expected rate of inflation of 2.1 percent. The final funding levels

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requested will be determined by the defense strategy review currently underway (see Chapter 6).

ENVIRONMENTAL PROTECTION AGENCY (EPA)

In EPA, the Office of Research and Development (ORD) is the primary source of support for research. Under the FY 2002 request, ORD would decline 6.8 percent to \$535 million. The extramural Science To Achieve Results (STAR) programs would be funded at \$100 million.

Chemistry plays an important role in much of EPA's decision-making processes, and is critical to understanding and solving the nation's environmental challenges. ORD support of chemical research is important to EPA's ability to address the high-risk concerns about clean air and water. An important research effort involving chemistry focuses on developing convenient field screening methods for measuring pesticide residues in foods. A long-term goal of environmental systems management research is to develop and evaluate the fundamentals of green chemistry and engineering approaches for cleaner chemical and biochemical processes and cleaner materials (*e.g.*, free of persistent bioaccumulative toxics) in selected industrial, energy, and consumer sectors.

Within the Particulate Matter (PM) Research program, a portion of \$2.8 million would be redirected to augment research in the atmospheric sciences that supports implementation. Almost \$1.3 million in redirected resources would support PM exposure measurement research. This work would provide the basic field data to develop and test EPA's Human Exposure Model.

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

USDA research seeks to improve environmental quality, food safety, agricultural productivity, and renewable chemical and energy resources. In USDA, the Agricultural Research Service (ARS) supports in-house chemistry research and the development of innovative technologies that could accelerate environmentally sound production practices, increase the understanding of the influence of global climate change on food production, and improve air quality. The proposed budget redirects \$15

million to develop new products from biomass. These products could lead to the development of chemicals, adhesives, lubricants, and building materials.

The Cooperative State Research, Education, and Extension Service (CSREES) provides the scientific foundation for an array of advances being made in agriculture and related industries. CSREES provides nominal funding for university-based chemical sciences through a competitive, peer-reviewed extramural program, the National Research Initiative (NRI). NRI would support fundamental chemical research in genetics, biobased products, food safety, and pest and disease management. The Administration proposes no increase in funding for NRI from the FY 2001 level of \$106 million (see Table II-13 and Chapter 11).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

Chemical science contributes to NASA's mission, including new knowledge about the universe, living in space, and the earth's atmospheric processes. NASA's Space, Biological and Physical, and Earth Science programs support chemistry research. (See Table II-12 and Chapter 10 for funding details of these programs.)

Satellite missions of the Earth Observing System (EOS) planned in FY 2002 would provide ozone and aerosol measurements and explore upper and lower atmospheric chemistry, contributing to understanding climate change and ozone depletion. Missions to Mars and Mercury would study the chemical composition of these planets, and a space mission would measure chemical composition in interstellar gas clouds.