

The Chlorine Debate: A Selected Bibliography

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Chlorine is one of the world's most widely used chemicals, the building element vital to almost every United States industry. We use chlorine and chlorine-based products whenever we drink a glass of water, buy food wrapped in plastic, purchase produce in the supermarket, pour bleach into a washing machine, have a prescription filled, print out a computer document or drive a car.

Chlorine, a member of the halogen (salt-forming) group of metallic elements, was first made by Swedish chemist Carl Wilhelm Scheele in 1774, who treated hydrochloric acid with manganese dioxide. In 1810, the English chemist Sir Humphrey Davy determined that chlorine was a chemical element and named it from the Greek word meaning greenish-yellow. One hundred and eighty-five years later, chlorine compounds are ubiquitous components in the manufacturing of paper, plastics, insecticides, cleaning fluids, antifreeze, paints, medicines, and petroleum products. The unfortunate and unavoidable by-product of these manufacturing processes is dioxin, one of the most toxic substances on the planet. Dioxins are also produced whenever chlorine containing substances, such as PVC, are burned.

Life as we know it will change, if a Greenpeace campaign is successful. The powerful environmental group has mounted a well-organized campaign that has as its objective nothing less than a total, worldwide ban on chlorine. With the public health and billions of dollars at stake, the debate over chlorine has become one of the world's most contentious and controversial issues. "Is a chlorine-free future possible?" asked Bonnie Rice, a spokesperson for Greenpeace's Chlorine Free Campaign. "Yes, it can be done without massive disruption of the economy and of society, if it is done in the right manner."

The chlorine industry and its allies say a total ban on chlorine would be neither wise, possible, nor economically feasible. "We find the chlorine campaign outrageous in its scope and purpose," explained Leo Anziano, the Chairman of the Washington-based Chlorine Chemistry Council, an organization that lobbies on behalf of the chlorine industry. "We believe it's based on pure emotion and not on science. Without any real study, it's been determined that all organochlorines (compounds containing chlorine) are harmful". The chlorine industry has presented many statistics on what it says will be the cost to society of substituting other substances for chlorine, and these figures are staggering. The net cost to consumers would exceed \$90 billion a year, about \$1,440 a year for a family of four, according to studies conducted by the Chlorine Institute. About 1.3 million jobs depend on the chlorine industry, an amount equal to the number of jobs in the state of Oregon. Wages and salaries paid to those employees totaled more than \$31 billion in 1990, approximately the same as the total payroll that year for all state and local government employees in Oregon.

"With its call for a total ban, Greenpeace has gone beyond common sense and is jeopardizing the health and economic well-being of this country," Anziano charged. Greenpeace is also well-armed with statistics. Their

spokesmen argue that, if implemented with careful planning, the transition to a chlorine-free economy could save money, create new jobs, and be "economically and socially just." Greenpeace puts the savings from phasing-out chlorine at \$80 to \$160 billion annually.

The phase-out of chlorine would take place over a 30-year period and would involve substituting what Greenpeace describes as "traditional materials and non-chlorinated plastics." In the pulp and paper industry, for example, a totally chlorine-free bleaching process would be implemented, while, in dry cleaning, water-based systems would replace chlorine-based solvents. Nothing is more contentious in the chlorine debate than Greenpeace's firm position that all chlorine and organochlorines threaten people and so should be banned. "Industry produces more than 11,000 chlorine chemicals, each of which could take years of study," explains Jack Weinberg, a spokesperson for Greenpeace's Chlorine Campaign. "Traditionally, we have looked at chemicals as being innocent until proven guilty. We need to change that approach."

Industry warns that it is a big mistake not to distinguish among chlorinated compounds because the mere presence of chlorine does not render a compound carcinogenic or harmful. "Regulations should target specific substances whose environmental harm has already been demonstrated through rigorous scientific studies," says Anziano. "The sloppy reasoning used by Greenpeace and their allies is no substitute for careful risk analysis."

Science aside, much of the chlorine debate has been emotional, and nothing has made tempers flare more than the issue of whether a link exists between breast cancer and chlorinated pesticides and other chlorine-based chemicals. Greenpeace has released a report, "Chlorine, Human Health and the Environment: The Breast Cancer Warning," which reviews "new scientific evidence" linking chlorine-based chemicals to breast cancer, an epidemic that kills 50,000 women annually in the U.S. alone. Not surprisingly, industry has produced its own "scientific evidence." For example, a study released by CanTox, a Canadian environmental consulting group, concluded that "it is evident ... the proposed causal association (of breast cancer) to bio-accumulative chlorinated organic compounds should be rejected."

In the titanic struggle over chlorine's future, industry is clearly on the defensive. Recognizing that the court of public opinion will be the final arbiter on the issue, it has begun to shift its own public relations machine into gear. The Chemical Manufacturers Association has established the Chlorine Chemistry Council, which has a multi-million dollar budget, while big chemical companies such as Dow Chemical have created full-time positions with names like "Director of Chlorine Issues." "We need to offer the public a different view of chlorine chemistry than the one the anti-chlorine forces have been purveying for years", says Brad Lienhart, Managing Director of the Chlorine Chemistry Council.

The anti-chlorine camp, however, has garnered the support of several influential scientific, environmental, and international organizations, including the International Joint Commission on the Great Lakes, the Paris Commission on the North Atlantic (a multinational-level meeting of 15 European governments and the European Community), the 21-nation Barcelona Convention on the Mediterranean, and the American Public Health Association.

Strong anti-chlorine sentiment exists in the White House, the U.S. Environmental Protection Agency (EPA), and the U.S. Congress. President Clinton's proposal for the Clean Water Act involves a strategy for reducing or prohibiting chlorine use. Meanwhile, the chlorine industry is worried that the EPA might curtail or even

ban the production of chlorine and organochlorines. These developments are making many chemical companies such as Vulcan and Dow Chemical look quietly for alternatives to chlorine. Dow, for example, has created a new business called Advanced Cleaning Systems, which provides water-based cleaning technology for green industrial niches. "In the future, we have to be more critical of irresponsible chlorine use to protect the essential uses of chlorine," Tom Parrott, Vulcan's Director of Environmental Health and Safety, explained to *Chemical Week*.

The following bibliography has been compiled to aid researchers interested in studying the chlorine issue. Although the detrimental effect of chloroflourocarbons (CFCs) on the ozone layer is a very important topic, it has been excluded from this bibliography because of the massive amount of literature available.

The bibliography includes monographs, journal and newspaper articles, UN, U.S., and international documents, Internet resources, and organizations to contact for more information. Except for newspaper articles, the bibliography fully covers the period from 1985 to 1994; because of the voluminous newspaper coverage, only articles from 1994 have been included. It is arranged by type of document, and, within types, the arrangement is alphabetical by author and chronological.

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INTERNET and COMPUTER RESOURCES

Gophers

[EnviroLink](mailto:gopher://gopher.envirolink.org): - gopher://gopher.envirolink.org

[Greenpeace Gopher](mailto:gopher://adam.greenpeace.org) - gopher://adam.greenpeace.org

Discussion groups

Dioxin-L.

listproc@essential.org (Postings are also available at the [Citizens Clearinghouse for Hazardous Waste](mailto:gopher://gopher.essential.org/11/ftp/pub/cchw) -
gopher://gopher.essential.org/11/ ftp/pub/cchw)

Other Internet resources EPA-PRESS. Official U.S. Environmental Protection Agency press releases distributed via its listserver. Subscribe to: listserver@dggis.rtpnc.epa.gov U.S. Environmental Protection Agency Library: Telnet to epaibm.rtpnc.epa.gov, port 23 using telnet. Use the account name "PUBLIC, OLS" to log in

ORGANIZATIONS

American Public Health Association, (APHA) 1015 15th St. NW Washington, D.C. 20005 phone: (202) 789-5600

Chemical Manufacturers Association, 2501 Main Street NW Washington DC, 20037 phone: (202) 887-1237

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