

Rachel's Environment & Health News

#149 - Some Chemicals Worth Banning

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The chemical industry is out of control and is destroying the planet earth as a place suitable for habitation by humans and other complex forms of life. This is not an exaggeration.

Consider these facts:

The production of organic chemicals has been increasing for 44 years at a steady 6.5% per year. Any quantity that increases by a constant fraction of the whole (in this case 6.5%) in a constant time period (in this case, one year) is growing exponentially.

Once you know something is growing exponentially, you immediately know some important things about it.[1] For example, to learn how quickly it is doubling, you divide the rate of growth (6.5%) into 70; thus the annual output of organic chemicals by U.S. industry is doubling every 10.7 years, which we will round off to 11 years.

Love Canal was discovered 11 years ago. So we know that the annual chemical production by American industry today is twice as large as it was in 1978 when Love Canal first came to light.

Another interesting characteristic of things that are growing exponentially is that, during one doubling-time (in this case 11 years), the total output equals the total output during all previous time. Thus during the period since Love Canal was discovered (the period 1978-1989), American industry has produced an amount of chemicals equal in size to the total quantity of chemicals produced during all of history prior to 1978. And during the next 11 years, 1989-2000, industry will again produce an amount of chemicals equal to all the chemicals produced prior to 1989.

Another way to look at something that is growing exponentially is to calculate how much it will grow during one average human lifetime (70 years). Something growing at 6.5% (actually 6.57%) per year will grow by a factor of 100 during one human lifetime. Thus a child born today reaching the end of its normal life span could expect the American chemical industry to be putting out 100 times as much chemicals per year as it is putting out today.

We have never met anyone who believes that the earth could sustain a chemical industry 100 times as large as the American chemical industry is today. **AND THESE FIGURES DO NOT TAKE INTO ACCOUNT GROWTH IN THE CHEMICAL INDUSTRY ABROAD.**

Industrial chemicals have now spread everywhere. For example, the scientific journal, ANNALS OF THE NEW YORK ACADEMY OF SCIENCES in 1977 (the year before Love Canal was discovered) published some surprising data about the occurrence of industrial chemicals in the umbilical cords of newborn babies in America. Chemicals measurable in the umbilical cord blood of newborns in 1977 included carbon tetrachloride (a carcinogen and a mutagen), acetone, dichloromethane, chloroform (a carcinogen, and a possible teratogen), benzene (a carcinogen and a mutagen), styrene (a mutagen), trimethylbenzene, dichlorobenzene, dimethylethylbenzene, and methyl propyl ketone. More were not found because more were not looked for. Some of these chemicals are found at greater concentrations in the blood of newborn babies than they are in the mothers', showing that some industrial chemicals cross the placenta and accumulate in the fetus during the first 9 months of its growth in the womb. The authors of this study say correctly, "...the fetus is routinely exposed to [industrial chemicals] during the critical stages of development. The impact of such exposure is unknown." [2]

It is unusual for doctors and scientists to study these matters. After Love Canal was discovered, the New York State Health Department looked at birth weights of human babies born to families whose homes fronted directly on the canal. Among those families living directly next to the canal (or to swales [ditches], which carried chemicals away from the canal), the incidence of low-birth weight

infants was 50% higher (12% vs. 8%) than in a control-group of families living elsewhere in the town. The NY State Health Department attributed these effects to chemical exposures of the mothers.[3]

Other studies have shown that low birth weight, which is very easy to study since all you need to look at is birth certificates, is strongly associated with severe birth defects, which are very expensive to study because you need a doctor's examination for at least the first five years of a child's life to see if a birth defect has become apparent; not all birth defects are apparent at birth. Somewhere between 1/6 and 1/3 of severe birth defects are obvious at birth; the remainder become clear during the first five years of a child's life. Four percent of American children are now born with "severe" birth defects and another 11% have "moderate but not trivial" birth defects.[4]

Industry is conducting chemical experiments on our children before they are born; after they are born, the experiment accelerates. Our water supplies are widely contaminated at low levels.[5] The blood of adults contains hundreds of industrial chemicals. We will never have the resources to study the effects of each chemical, much less the effect of combinations of chemicals. The only hope is to reduce chemical exposures. **THIS WILL REQUIRE US TO PRUNE THE SIZE OF THE CHEMICAL INDUSTRY.** This generation of Americans is going to have to learn to undo what our parents have done.

The thinning of the earth's ozone layer offers us an opportunity to learn how to manage the banning of chemicals because banning chemicals is a social activity we need to get good at quickly. Chlorofluorocarbons (CFCs) are not the only chemicals destroying the ozone layer. Good candidates for a total ban are Halon-1211 and Halon-1301, which are growing in the atmosphere at an astonishing 12% per year and which deplete ozone even more efficiently than chlorine.[6] Other excellent choices for a rapid phaseout would be methyl chloroform and carbon tetrachloride, both of which must disappear from use if we are to stabilize the levels of ozone in the earth's stratosphere.[7] Next in line for the axe might be a series of industrial compounds known to cause birth defects in humans: 1,3-butadiene, carbaryl, carbon disulfide, chloroprene, dinitrotoluene, epichlorhydrin, ethylene oxide, ethylene thiourea, glycidyl ethers, glycol ethers, and monohalomethanes.[8] It's long past time to stem the tide of toxics flowing over us all. **SIXTY THOUSAND AMERICANS DIE EACH YEAR FROM BIRTH DEFECTS.**[9]

Obviously, not all chemicals can be banned, but in almost every case production can be cut back. This will require scheduled reductions with verification by outside parties. We must learn from international weapons treaties: independent verification is the key to success.

--Peter Montague

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[1] We have written a short report (available for \$4.00) called "How Big Could This Problem Become?--Ways for Journalists and Environmentalists to Project Future Growth," which tells you how to use a \$12 Radio Shack pocket calculator to learn the characteristics of things that grow exponentially. This is useful because most things in the modern world are growing exponentially, including human population, energy use, automobiles, chemicals, habitat destruction, and so forth.

[2] John Laseter and Betty Dowty, "Association of Biorefractories in Drinking Water and Body Burden in People," ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Vol. 298 (1977), pgs. 547-556.

[3] Nicholas Vianna and Adele Polan, "Incidence of Low Birth

Weight Among Love Canal Residents," SCIENCE Vol. 226 (Dec. 7, [1984,] pgs. 1217-1219.

[4] Roberta Christianson and others, "Incidence of Congenital Anomalies among White and Black Live Births with Long-Term Follow-Up," AMERICAN JOURNAL OF PUBLIC HEALTH Vol. 71 (December, 1981), pgs. 1333-1341.

[5] H.F. Kraybill, "Global Distribution of Carcinogenic Pollutants in Water," ANNALS OF THE NEW YORK ACADEMY OF SCIENCES Vol. 298 (1977), pgs. 80-89.

[6] "Rising Bromine Levels Threaten Ozone Layer," C&EN [CHEMICAL & ENGINEERING NEWS] Aug. 22, 1989, pg. 6.

[7] Pamela Zurer, "U.S. Seeks Tighter Rules on Ozone Protection," C&EN [CHEMICAL & ENGINEERING NEWS] May 1, 1989, pgs. 8-9.

[8] U.S. Congress, Office of Technology Assessment, REPRODUCTIVE HEALTH HAZARDS IN THE WORKPLACE (Washington, DC: U.S. Government Printing Office, Dec., 1985), pg. 67.

[9] U.S. Congress (cited above), pg. 351.

Descriptor terms: chemical industry; love canal; ny; carbon tetrachloride; carcinogens; benzene; acetone; chloroform; styrene; methyl propyl ketone; birth defects; cfcs; butadiene; carbaryl; carbon disulfide; ethylene oxide; ethers; ozone depletion; bans; chemical production statistics; developmental disorders; teratogens; mutagens; carcinogens; atmosphere; stratosphere;