

INTRODUCTION TO UNDERSTANDING CHEMICALS



INTRODUCING CHEMICALS

Since the early 1900's the chemicals industry has developed thousands of substances resulting in more than 78,000 chemicals being used in commerce today. We are exposed to chemicals every day from pollution, pesticides, household items like non-stick pots and pans, shower curtains, mattresses, cushions, cleaning compounds, and even cosmetics and personal care products. Most of these chemicals were considered safe when first put into commerce, but through modern science we have now determined that some are now considered hazardous to human health and the environment and are still available on the market. It is now more important than ever that everyone is aware of the chemical hazards that surround them, not only to know how to better protect themselves, but also how to become more effective community health advocates.

WE HAVE DEVELOPED THIS SERIES OF FACT SHEETS TO SUPPORT YOU IN PROMOTING
AWARENESS ABOUT CHEMICAL HAZARDS.

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Advances in public health and environmental protection have played a big part in improving the health of Canadians. Despite this progress, exposure to environmental contaminants remains a serious concern for many communities, especially vulnerable populations. This is because these groups, due to their age, medical condition, social and economic status, living and working conditions or geographic location are at greater risk of developing health problems than the general population. Also, a growing concern for many Canadians is the affect of long-term exposure to low levels of environmental contaminants, which are everywhere and seem to be in everything we touch, eat, drink or breathe.

Depending upon the evidence, government action for managing the risks of environmental threats may vary from a bare minimum; such as increasing public awareness, to banning the manufacture, sale, importation and release of the substance. In Canada, Health Canada and Environment Canada jointly administer a program called the Chemicals Management Plan, a process meant to assess and prioritized 5000 chemicals whose affects were uncertain in 2006. The Government of Canada's Chemicals Management Plan is intended to improve the degree of protection against hazardous chemicals. It includes a number of new, proactive measures to make sure that chemical substances are managed properly.

A policy of taking action now will significantly reduce future costs associated with water treatment, clean-up of contaminated sites, and treating illnesses related to chemical exposure. It will improve Canadians' quality of life, and better protect our environment.

CANADA'S CHEMICALS MANAGEMENT PLAN

The Canadian Environmental Protection Act (CEPA) of 1999 requires the Government of Canada to categorize all of the chemicals on the Domestic Substances List by September 2006 to see whether they possess certain characteristics that may indicate they pose a risk to the environment or human health. Those characteristics are:

- **Human Exposure** - those substances that have the greatest potential for exposure to Canadians.
- **Persistence** - the time it takes for a substance to break down in the environment.
- **Bioaccumulation** - the tendency for a substance to accumulate in the tissues of living beings and be passed up through the food chain.
- **Inherent Toxicity** - whether a substance is harmful by its very nature to human health or other organisms.

The Chemical Revolution

A major environmental concern is the ever growing use of chemicals in industry, agriculture and consumer products — a revolution in chemistry that is said to be even more significant than the Industrial Revolution. Although the prevalence of chemicals in everyday products may make their use practically unavoidable, there are increasing concerns about related health hazards. Of particular concern is long-term exposure to low levels of chemicals and their adverse effects on the developing foetus, infants and children.

Recognizing that a completely risk-free environment is not an achievable goal, governments need a systematic decision-making process to determine the level of risk that is acceptable both to the environment and to public health. A number of frameworks have been designed over the years, all of which include the following steps:

- Identify the hazard
- Characterize and quantify the risk (risk assessment)
- Develop options for controlling the risk
- Implement control measures (risk management)
- Communicate the options (risk communications)
- Evaluate the impact

Please see the Hazard vs Risk
Fact Sheet for more
information

Health Canada's current approach to decision-making (Canada's Chemicals Management Plan) incorporates these steps. Although this decision-making process appears to be straight forward and simple, it involves a number of steps that develop uncertainties, such as:

- Extending the evidence found during high exposure scenarios to determine risk at lower doses
- Extending the evidence derived from animal research to human risk
- Using past or current data to predict future effects (modeling)
- Assessing the effects of exposure in complex mixtures of chemicals and their interactions

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Not all dangerous chemicals are artificial or man-made. Neither are all chemicals cancer-causing or harmful in low doses. However, this subject is highly technical and encompasses uncertainties and sometimes conflicting evidence of harm to health and the environment. For this reason, it is better to err on the side of caution for those situations where chemicals and their impact upon people and the environment may not be fully understood. This is called the Precautionary Principle.

The Role of Science and the Precautionary Principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. (United Nations, 1992)*

According to government, the aim of hazard identification, risk assessment and risk management is to identify a course of action that is not only scientifically sound (i.e. based on evidence), but also cost effective and integrated. In other words, risks are reduced while taking into account key social, cultural, ethical, political, economic and legal considerations; i.e. the costs and the benefits. Although scientific input is important, establishing a clear-cut cause and effect relationship is a long and difficult process with many uncertainties. This is complicated by the fact that most chronic illnesses like cancer have a long latency period. To make matters worse, new analytical techniques can change overnight. As a result, discussions of environmental and health protection over the past quarter-century have increasingly given attention to an approach that is guided by the “precautionary principle.” This principle advocates that visible and certain evidence of harm does not have to exist before taking action to protect people and the environment from harm. The most widely-accepted definition of the precautionary principle is one endorsed at the Earth Summit in Rio in 1992; an important and groundbreaking international conference on the environment. The Rio Declaration states that: **Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.** (United Nations, 1992)

Canada endorsed this principle and later built it into the Canadian Environmental Protection Act (CEPA) in 1999. In 2003, the Government of Canada issued a policy for guiding the application of precaution to science-based decision-making in all areas of federal regulatory activity. In other words, the federal government supports the principle of “better safe than sorry.” However, this may be complicated by the cost of removing or reducing the quantity of a hazardous substance from production and the environment. Industry may say, it is not reasonable nor economically feasible to manage a chemical

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beyond what is being done today. This is where citizens and especially vulnerable populations must become involved in assessing the situation and taking a stand. Knowledge is power.

Chemicals are tested to set a “threshold” level for its toxic effects. This determines at what level of exposure a chemical could pose harmful effects to humans. However, what size of a dose will harm a lab rat only tells part of the story. Traditional toxicology testing cannot detect the harmful effects of very low doses of some chemicals and of low doses over the long term. Furthermore, traditional tests do not always take into account the impact the chemical has on future generations.

There is a newer field of science called epigenetics which offers a complementary form of testing the safety of chemicals. Epigenetics is the study of inherited changes in genes other than DNA, or in other words, it looks at how chemicals change our bodies over generations. There are chemicals that do not exhibit short term toxic effects, but are capable of changing how the cells in our bodies work. These changes are then inherited by our children. Our government must take into account new ways of testing chemicals in order to ensure that we are not susceptible to health effects now or in future generations.

You Don't Have to be a Scientist to Protect Your Family!

You shouldn't have to be a scientist to keep your family safe. To reduce exposure to toxic chemicals we have to act collectively – through our workplaces; through environmental, community and union groups; and most importantly through our political systems.

- **We have to act now.** There are too many chemicals on the market in Canada that we know too little about. We need to re-evaluate the chemicals allowed on the market and take the chemicals off the shelves that we know cause cancer and other chronic illnesses. To reduce waste, reuse and recycle protects the environment. We also need to be attentive to environmental degradation and sensitive ecosystems, and monitor those chemicals that disrupt our endocrine (immune and reproductive) system. Reducing toxic chemicals in consumer products and the waste stream is not only your concern, but a global concern.
- This means that the quality and weight of all evidence must be taken into account even if it falls short of indisputable scientific proof. Complete assessments of existing and new chemicals must be done before they are released into the environment and into our bodies.

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- The government should ensure that all hormone disrupting chemicals, cancer-causing chemicals and persistent chemicals are taken off the market. Call your MP and tell them they should be evaluating chemicals before they go to market as they have done in Europe. If you are among those considered to be a population at risk, demand information on how to protect yourself.
- Talk to your friends, family, council and local government about the difference between an ounce of prevention and a pound of cure, and demand action on all the things we can do to make a difference in our communities, our workplaces and in the lives of our families.

Although chemicals are everywhere and are important to commerce, keep in mind that “taking action now will significantly reduce future (financial and social) costs associated with water treatment, clean-up of contaminated sites, and treating illnesses related to chemical exposure.”