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POPs - Persistent Organic Pollutants

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The production and use volume of chemicals has been and is still increasing, and the number of substances in use is very high. Chemicals are used because they fulfil one or several functions, such as lubrication, flame retardation, colouring and curing diseases. The modern society is dependent on a number of these functions, and therefore of the chemicals to fulfil them.

In the 1950's and 1960's it became obvious that of some of the chemicals in use were responsible for unexpected effects in humans and the environment. A tragedy happened in Minamata Bay, Japan, where more than one hundred people were poisoned by mercury being emitted from a chemical factory. It also became clear that some of the pesticides (e.g. DDT and Toxaphene) gave unexpected effects in the environment, not only where they were used but also in other areas. Furthermore, chemicals being used mainly in closed systems also could be detected in the environment (e.g. PCB). Another discovery was that impurities in and transformation products of chemicals also could cause problems for man and the environment (e.g. polychlorinated dioxins and furans).

The risk for unwanted effects as a result of the use of a certain substance has to be weighed against the benefit that use can give. The risk is estimated in risk assessments where the effect doses are compared with the exposure. It is not possible to cover all effects, and there may also be effects not known today. It is also difficult to get good estimates of the exposure, especially if this is complex and comes via several routes. The possibilities to use models to predict both effects and exposure is improving and will be used more in the future. A comprehensive risk assessment of one single chemical is very resource demanding and takes normally several years to perform.

Substances with long half-life times in the environment, often called persistent (P), will be able to act over a long period of time. This extended period will also make it possible for these substances to be transported over large distances. Persistent compounds may therefore act far away from its sources, which make it very difficult to link the effects to a specific source and compound.

A substance, which is able to come into an organism, bioaccumulate (B), has the possibility to interact with essential biological functions. The combination of bioaccumulation and persistence (PB chemicals) is thus a warning flag and a substance with these properties has to be handled with care.

The toxicity (T) of a compound depends on its interaction with biological processes, and there is a wide range of different effects known today. There are probably also several effects that have not been discovered yet, and a good example is the recent interest for endocrine disruption. This is not really a newly discovered effect, but the magnitude of its importance was earlier underestimated.

A lot of attention has been paid to PBT substances during the last decade, and several international, regional and national protocols to handle these have been established. Recently the UNEP POPs protocol was signed (the Stockholm Convention), and it focuses on twelve of the worst PBTs.

Substance/group of substances	Main use	Measure
Aldrin	Pesticide	Elimination
Chlordane	Pesticide	Elimination
Dieldrin	Pesticide	Elimination
Endrin	Pesticide	Elimination
Heptachlor	Pesticide	Elimination
Hexachlorobenzene	Intermediate	Elimination
Mirex	Pesticide	Elimination
Toxaphene	Pesticide	Elimination
PCB	Electrical equipments	Elimination by 2025
DDT	Pesticide	Only allowed for disease vector control
Polychlorinated dioxins	Unintentional production	Restrict production
Polychlorinated furans	Unintentional production	Restrict production

These substances have been found in humans and in the environment all over the world and several of them are known to give severe effects, including endocrine disruption. The protocol also gives a possibility to add more substances to this list, and the criteria for doing that are well specified.

It is presently discussed in several fora (e.g. European Union Commission) if the most persistent and most bioaccumulating (vPvB for very persistent and very bioaccumulating) substances should be restricted even if no adverse effects have been linked to them. This precautionary measure is motivated by the fact that it is impossible to prove that a substance has no toxic effects, and if a vPvB substance, emitted to the environment, is found to have a severe effect it is impossible to stop its effect for a long period of time over a large area.