

# Persistent, bioaccumulative and toxic chemicals (PBTs) on the SIN List

## PBTs ARE CHEMICALS OF HIGH CONCERN

With this update, further persistent, bioaccumulative and toxic chemicals (PBTs) have been added to the SIN List to catch up with new knowledge and to highlight the need to phase these chemicals out from processes and products. PBTs represents three hazardous properties. Each of them non-desirable, but when in combination such substances become extremely problematic. The criteria for the PBT and vPvB assessment can be found in REACH Annex XIII.

- Persistent (P) chemicals degrade slowly and are long-lived in the environment.
- Bioaccumulative (B) chemicals are taken up by organisms at a higher rate than they can be excreted. Thus they can be transferred and even magnified through the food web. Top predators, as ourselves, often end up having the highest concentrations.

- Toxic (T) chemicals are toxic to human health and/or other organisms.

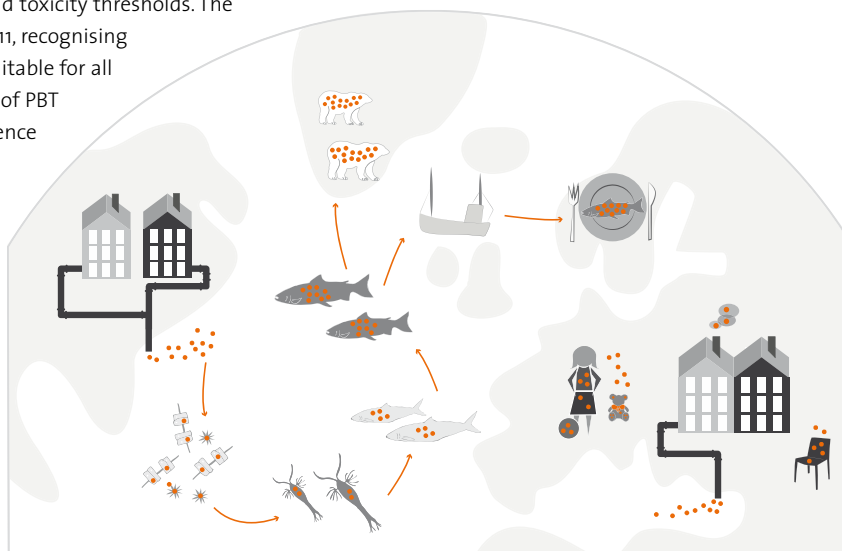
Once these chemicals are out in the environment they will stay unchanged for a long time. The problems may remain for decades after phase out. This is also why old well-known and restricted hazardous chemicals, such as PCBs and DDT, still cause health and environmental problems. In addition they transfer rather easily among air, water and land and can be found even in remote places. High levels of certain man-made chemicals have been reported e.g. in polar bears in the arctic or the Inuit population at Greenland.

## IDENTIFICATION OF PBTs AND VPVBs

The identification of PBTs can be very complex since there are three different endpoints that need to be considered separately and in combination. In the EU, the REACH regulation lists PBTs and vPvBs (very Persistent and very Bioaccumulative) as one category of Substances of Very High Concern (SVHC). The regulation sets up criteria for the three endpoints; degradation half-lives, bio-concentration factors and toxicity thresholds. The criteria for vPvBs were amended in 2011, recognising that available test methods are not suitable for all substances and do not catch all types of PBT properties. Therefore a weight of evidence

approach is needed to weigh in all data, including standard tests, biomonitoring data, calculated data and read-across with similar substances. In addition, the SVHC category “equivalent level of concern” can be used to identify high concern chemicals with these properties that do not strictly fulfill the PBT/vPvB thresholds.

*Persistent and bioaccumulative chemicals are used in a variety of products, including textiles, furniture, toys and building materials. Persistent chemicals do not easily degrade and can in many cases be transported also to remote parts of the world. Bioaccumulative chemicals that enter the food chain will magnify for each level, leaving top predators – such as whales, eagles, polar bears and ourselves – with the highest concentrations.*



## PBTS ON FORMER VERSIONS OF THE SIN LIST

For the first version of the SIN List, ChemSec included PBT substances from the list developed by the EU PBT working group. From this list substances not relevant to REACH were removed, such as pesticides. In addition, substances already taken up by the international Stockholm Convention on Persistent Organic Pollutants were removed, since those were

considered tackled. However substances that have later been added to the Stockholm Convention may appear on the SIN List as well as on the candidate list within REACH. The reason for this is that the latter Stockholm Convention substances have been taken on with significant use exceptions.

## THE NEW SIN LIST PBTS

Since the first version of the SIN List, the occurrence of several new and emerging PBTS has been highlighted in the scientific literature. While old PBTS are finally being tackled and restricted, they seem to have often been replaced by similar substances as a result of unfortunate substitution. The REACH amendment, opening up for weight-of-evidence approach on PBT substances, has improved the possibilities of identifying substances with PBT properties. The ECHA PBT group has ongoing discussions on possible PBT substances, and ChemSec turned to experienced scientists to perform substance evaluations. For a full description of the process, please consult the SIN List methodology document.

### Examples of categories of PBT substances on the SIN List

#### Polyfluorinated and perfluorinated substances

These substances have been increasingly used the last decades. The chemicals are surface active and hydrophobic and are therefore used in everything from engines and water-proof textiles to frying pans and food packages. Some of the more well-known of these compounds are PFOA and PFOS. Since these have gained attention and customers have been starting asking for alternatives, other fluorinated compounds have been developed to fulfil the functions of the old ones. There is however an increasing concern about these emerging alternatives.

#### Halogenated aromatic substances

Among these substances are for example brominated flame retardants. They are used to prevent fire in many types of materials from building materials to furniture, clothes and electronics. In addition to the hazardous properties of the parent compounds, these can also form highly problematic dioxins and furans during waste-phase. Well-known brominated flame retardants are for example Deca-BDE, TBBPA and HBCD. Again, the replacements for the well-known hazardous chemicals are in many cases very similar compounds.

## REFERENCES:

- Bimbaum L and Bergman Å 2010. *Brominated and Chlorinated Flame Retardants: The San Antonio Statement. Environmental Health Perspectives* 118(12): 514-515.
- Bouwman H et al. 2013. *Late lessons from early warnings. Chapter 11, DDT; fifty years since Silent Spring. EEA report No1 2013.*
- ECHA 2012. *Guidance on information requirements and chemical safety assessment Chapter R.11: PBT Assessment. Guidance for the implementation of REACH.*
- Global Chemicals Outlook. Towards Sound Management of Chemicals. Synthesis report for decision makers. UNEP 2012.*
- Scheringer M et al. 2014. *Helsingør Statement on poly- and perfluorinated alkyl substances (PFASs). Chemosphere* 114: 337-339.

*This project is supported by the Life+ project of the European Commission DG Environment (Child Protect project), Mistra and the Swedish Environmental Protection Agency.*



[www.chemsec.org](http://www.chemsec.org)