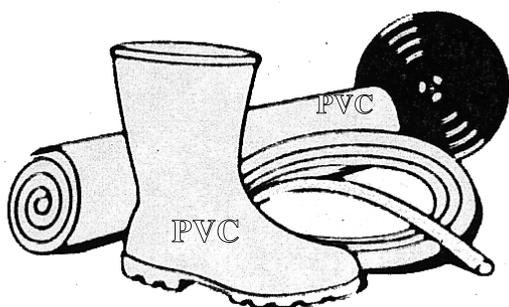


# Phthalates

## Use

Phthalates are found in a large range of plastic goods, where they are used as 'plasticisers' to add flexibility to the product. They are also found in paints, inks and adhesives. In the mid-1980s production reached 2.7 million tonnes per year.



Phthalates are not tightly bound into plastics and so can migrate into the environment during the life of the product or in the landfill sites after disposal. They are also released from numerous industrial sites. They have a tendency to accumulate in fatty tissue. When released into the wider environment, they are adsorbed onto sediments and may not breakdown for a long time. Further studies of environmental persistence are required.

## Toxicity

Some phthalates can seriously damage male testes and cause reproductive failure, for example causing dramatic decreases in the sperm count of rats. Some have been shown to mimic oestrogens in laboratory tests, although recent studies suggest that the major endocrine disrupting effect is via another mechanism. Concerns have focussed on whether phthalates might be implicated to some extent in the decreasing sperm counts in men, and the increased incidence of male reproductive organs disorders.

## Endocrine Disrupting Chemicals: Phthalates

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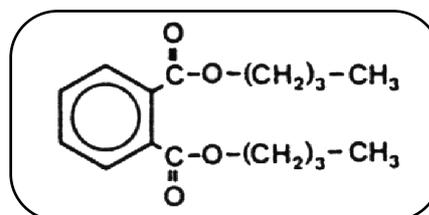
Many studies have highlighted the reproductive toxicity of phthalates. A number of phthalates cause wasting of the testes in animals and decrease sperm counts in mice. Certainly, the main target for many phthalates is the mammalian reproductive system.

It appears that sexually mature animals are less susceptible to phthalates, these being more toxic in systems involving rapid cellular division, making foetuses and pre-pubescent animals most at risk.

## Wildlife Exposure

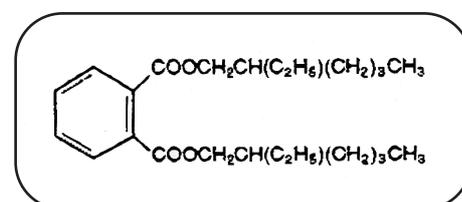
Phthalates are widespread marine contaminants and can be found even in remote marine locations as well as bioaccumulated in bird eggs, fish and seals. Exposure to phthalates is likely to be causing adverse effects in wildlife in heavily contaminated waters and sediments near industrial discharges containing phthalates.

A comparison between recorded environmental levels and those that cause effects in long-term studies, especially early life stage tests on fish and amphibians, indicates that a hazard for the environment particularly via water and sediment cannot be ruled out. For example, dibutylphthalate (DBP) has been found above chronic safe levels at a dredged spoil dump site off the UK, while diethylhexylphthalate (DEHP) has exceeded chronic 'safe' levels in the Mersey, Tees Bay and off Plymouth.



Dibutylphthalate (DBP)

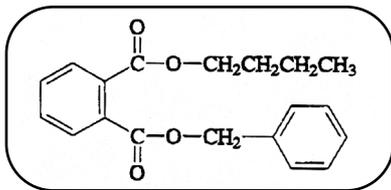
Due to differences in metabolism, some wildlife species may be more susceptible to the harmful effects of phthalates than humans. The most sensitive species, those most likely to suffer from the endocrine disrupting effects of phthalates, are likely to be those with less ability to conjugate the primary metabolites of phthalates, making them hormonally inactive.



Diethylhexylphthalate (DEHP)

## Human Exposure

The bulk of the human intake of phthalates is likely to occur or have occurred through direct contamination of foodstuffs, from food packaging such as cellophane, rayophane, aluminium paper-foil laminate packaging (such as on some butters) or foil lids. This has led to butylbenzylphthalate (BBP) concentrations of 13 - 15 mg/kg in sandwiches and up to 12 mg/kg in meat pies packed in nitrocellulose-coated regenerated cellulose film, as well as up to 47.8mg/kg in butter and margarine packed in aluminium paper-foil laminate.



Benzylbutylphthalate (BBP)

DBP has also been found in printed paper board packaging. In a recent survey of 100 retail samples of packaging, DBP was found in 98% of the samples between 0.04 - 62 mg/kg.

In the UK, phthalates were also found in all brands of infant formula tested, and it is certainly a matter of some concern that babies may be exposed to various phthalates through infant formula and from the leaching of phthalates from sucked plastic toys.

Human exposure can also occur by uptake from the wider environment. For example, DBP has been found in fish, oysters, and egg white. Similarly fish and seafood are frequently contaminated with DEHP in industrial areas, and not surprisingly, DEHP has been detected in human body fat.

## North-East Atlantic and International Action

The 1995 Ministerial Declaration on the Protection of the North Sea at Esbjerg specifically highlighted EDCs and requested the Oslo and Paris Commissions (OSPAR) and the European Commission to “adopt necessary measures” by the year 2000. It also specifically highlighted phthalates as a potential problem and;

*“Invited OSPAR and the Commission of the European Communities as a matter of urgency to launch investigations and/or risk assessments to improve the knowledge of the consequences of substances suspected to have endocrine or hormone-like effects, for example certain phthalates, and to adopt necessary measures.”*

In 1997, the United Nations Economic Commission for Europe (UNECE) negotiated a Protocol on Persistent Organic Pollutants (POPs) to focus initially on 15 or so groups or substances, some of which are EDCs. However by no means all identified EDCs are to be covered by this Protocol. In June 1998 Environment Ministers from European countries, Canada, the USA and the EU agreed on the POPs Protocol including measures to ban, phase-out and/or restrict the use of 16 substances. Phthalates have not been included.

Both Sweden and Denmark are considering banning phthalates. Belgian toy manufacturers have removed all phthalates from toys. Spanish authorities have banned the sale of specific toys containing large quantities of phthalates and commissioned an official report to assess the risks of PVC. In January 1998, the Environment Agency for England and Wales called for unilateral action from industry to minimise the entry of known or potential endocrine disruptors to the environment by phasing out the use of existing products and developing substitutes. The Agency specifically cites phthalates.

The European Commission is currently preparing a Directive on the use of phthalates in PVC articles, although moves to ban certain soft plastic toys containing phthalates have, to date, been blocked. EU wide measures to prohibit PVC toys will be postponed depending on the result of a Dutch study on phthalate migration.

## Reduction of Inputs

WWF recommends that the amount of phthalates released into the environment should be reduced in line with the precautionary principle, with a view to phasing out the use of phthalates which can disrupt the endocrine system.



## In relation to all EDCs, WWF believes that

- The OSPAR Commission should take immediate action to phase out and eliminate already identified endocrine disruptors. Furthermore endocrine disrupting properties should rank high under the prioritisation process for hazardous substances to be considered for such measures;
- Current toxicity tests need to be improved with re-testing of substances undertaken;
- Research needs to be adequately funded, prioritised and co-ordinated;
- An international task force needs to be set up to assess the potential effects of hormone disrupting chemicals and opportunities to reduce their use;
- The European Commission should establish a unit or working group on endocrine disrupting chemicals.

Text prepared by Guy Linley-Adams and Gwynne Lyons

## Reference/Further Reading

WWF UK (1996) Phthalates in the Environment. A report for WWF United Kingdom by Gwynne Lyons.