

**INNOVATION CIRCLE IN MATERIALS, AEROSPACE
TECHNOLOGY AND NANOTECHNOLOGY**



TECHNOLOGY WATCH REPORT

**ALTERNATIVES TO PHTHALATE USE IN INKS
AND ADHESIVES**

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EXECUTIVE SUMMARY

Plasticizers improve flexibility and polymer processing. The most commonly used plasticisers are phthalates like di(2-ethylhexyl) phthalate (DEHP), diisononyl phthalate (DINP), diisodecyl phthalate (DIDP), dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP). There are more than thirty different phthalates types in the market.

Most phthalates have excellent adhesive properties, and they are often employed in the manufacturing of several product groups like adhesives, paintings, inks, coatings, etc. Phthalate esters, nonilphenol (NP), bisphenol A (BPA) y diglycidyl ether of bisphenol A (DGEBA), are used normally in the manufacturing of plastics, epoxy and coatings for food packaging.

Food in contact with these products may contain some of them, due to different causes: environmental pollution, transfer to the food chain, migration from packaging, and bottling material.

At first, it was thought that phthalate esters were innocuous for human health and they were often used for the manufacturing of children toys and medical and chirurgical plastics. More recent reports reveal possible endocrine disrupting activity associated to the use of phthalate.

In particular, in the last two decades phthalates have been a target of world-wide environmental groups and consumers by their potential carcinogenicity and possible endocrine modulating effects. In particular, medical plastics based in PVC received more attention because medical uses are the 10% of phthalate market.

In 1998, EC Scientific Committee of Toxicity, Ecotoxicity and environment, consider pernicious for human health doses higher than 69 mg/Kg per day, where the average of day exposition was 2.3-2.8 µg/kg in Europe and 4 µg/kg in US.

Plasticiser industry is developing new techniques for minimise the negatives effects of these chemicals. The techniques are:

- Reducing migration by: a) surface modification, b) polymeric plasticiser use, c) use of alternative plasticisers and d) use of alternative polymers.
- Introducing new high temperature plasticisers
- Minimising the plasticiser impact in health and environment by reducing their exposure and decreasing their toxicity.
- Developing plasticisers for biodegradable polymers.

Several research works about different kind of plasticisers have been identified: as sheets from soy protein isolate with ethylene glycol as the plasticizer, citrates as plasticiser of polyvinyl chloride and biopolymers: polyoles and plasticisers amine base, and about the use of a milk derivate protein as a functional component in adhesives.

Market overview shows a decreasing production of dibutyl phthalate (DBP), 49.000 t/y in 1994 to 37.000 t/y in 1997 and 26.000 t/y in 1998.

Scientific and inventive activity analysis conclude that there is an increasing interest in the study of alternative technologies to the use of phthalates in order to decrease their quantity in the materials in contact with food and, to use plasticisers and biodegradable polymers.

In conclusion, further study of the use of inks and adhesives within the materials for food packaging it is need to determine if the migration of chemical from the packaging to the food represents a risk for consumer's health.