

PVC was invented in the late 1800's and since the early 1940's has been used for a wide range of applications such as flexible films, floor tiles, pipes and packaging. There are very few other polymers that have been developed to perform such a wide variety of end applications due to these manufacturing and formulation developments. There is also no single polymer that is capable of replacing PVC, and many of the alternative materials are financially unviable for many of the applications or have additional environmental impacts.

The manufacture of PVC resin has historically and correctly been identified as having negative impacts on human health and the environment. These have essentially been eliminated or controlled through modifications to materials handling and manufacturing processes. One of the continuing debates is the use of plasticisers, which are used when products require flexibility as a primary property.

To manufacture PVC from a raw material through to a finished product requires the processor to develop formulations according to the end use of the product. The majority of materials added to PVC are either encapsulated within the finished article or permanently bound onto the PVC and do not migrate after manufacture. When soft and flexible products are produced from PVC, plasticisers are added as part of the formulation to allow molecules to slide past each other and impart flexibility. Some of these plasticisers can also slide or migrate out of the product after manufacture for the same reason. Scientific studies have identified that these are easily metabolised by humans. When some plasticisers, in particular phthalate based, are ingested at rates in excess of 1000 times that which are likely to migrate from PVC products there is a risk to human health, specifically to babies and small children.

There are a large number of plasticisers used, and they differ greatly in terms of cost, performance and toxicity. There has been a substantial volume of research undertaken on this group of materials. The papers produced supporting the use of plasticisers have largely been funded by industry and may be perceived as being partially biased, however there are a significant number of findings by legislative authorities that appear to support the industry research. In the case of research that has found concern with the continued use of plasticisers, significant debate has been raised about the quality and findings of the research. For both proponents the arguments appear very polarized.

The research currently being presented identifies the volumes of plasticisers that migrate and relates these to how much may be ingested or contacted by humans. These volumes are significantly lower than that which has been shown to cause any form of defects in either rats or primates. The arguments against the use of plasticisers being that phthalates (one type of plasticiser) in high concentrations can have negative effects on reproductive organs in both females and males, and can be passed from mother to baby and that due to the nature of their toxicity any level is excessive and they should not be used. The most widely investigated are plasticisers known as DEHP and MEHP. There are numerous other plasticisers in use.

Another plasticiser used is ESBO, or epoxidised soya bean oil. The World Health Organisation has set maximum migration levels for all additives used that are likely to contact food. With ESBO being capable of migrating, a threshold level has been established, however there have been no reported concerns and initial investigations are underway to quantify the effects if any on humans.

Within New Zealand phthalates have been almost entirely replaced with plasticisers based on adipates or citrates. These are currently understood to have a lower toxicity than phthalate plasticisers. There are also maximum migration values permitted which have been established along the same guidelines as ESBO.

Where PVC is used, if the product is not flexible then a plasticiser is highly unlikely to form part of the formulation. If the product is flexible and produced in New Zealand for food contact applications or children's products, then it is unlikely to contain a phthalate plasticiser. If you are unsure about the suitability of a PVC product or the potential of it containing a plasticiser we recommend you contact the supplier or manufacturer for further information, they will be very happy to provide the information you require to make an informed choice.

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