

## Newsletter 26 November 2013

I try base my newsletters on questions people ask and also their comments so keep them rolling in. For the time being I have given up on running a forum, may be people are shy about putting their names on the web. I have had request to comment on the Gardening Australia self-watering bed so this should have been the topic of this newsletter (next time) but I have to admit I have got myself into a bit of a problem.

I like to answer all questions directly and have had several people ask about the toxic quality of liners. I did give a reply to the first question but now cannot find the emails of the other enquirers so apologies to these people and I am making liners and toxicity the subject of this newsletter.

### Short answer

Well the short answer is black polythene is fine but for those wanting a more detailed answer here we go.

### Plastics – the hope and reality

Before the Second World War the only plastics were thermosetting plastics like phenolics, better known as Bakelite but during the war a number of thermoplastics were developed, mainly polyethylene, nylon and PTFE (Teflon). Polythene with its dielectric properties played an important part in the development of radar which was critical in the war.

After the war these materials were promoted as the wonder material of the age, they would replace sliced bread and aeroplane wings. In that era I was young and gullible (as opposed to my current state of old and gullible) and after University joined the plastics industry as an engineer to study their mechanical properties. I am not a polymer chemist but I have sat at enough lunch table discussion to make some comments.

Like most new innovations which are going to change the world (including the iPad) the disadvantage only become apparent after they have cashed the cheque. Plastics were being promoted as chemically inert, not attacked by chemicals and safe and nontoxic. That is in fact true; in particular polythene is a long chain molecule of carbon and hydrogen and meets these claims. When polythene decomposes it give of water and carbon dioxide.

## **The side attack**

But you are never caught out by the frontal attack it's what sneaks in from the side that gets you and that was UV degradation. Anyone who has left a plastic milk bottle in the sun knows how it goes hard and brittle.

Polythene can be stabilised by chemicals or carbon black. If the polythene is clear (with a whitish tinge) then this probably means it is unstabilised so will degrade rapidly in sunlight. I have used this as a liner where any waste plastic may not be disposed of properly. It does not degenerate under the ground protected from UV.

The chemically stabilised version has a slight green tinge as seen in tree guards, not a big problem but still there. Carbon black stabilised polythene is very safe.

The other common film material is PVC. Now PVC (as in pipes) is rigid, carbon is the backbone but the side elements are chlorine which is toxic when burned.

PVC can be made flexible by some chemical additive e.g. swimming pool liners. The early additives were simply horrible. Lead and arsenic make excellent flexibilisers, which most reputable companies stayed away from but used antimony as a 'safe option'. These have all now been banned for many years in Australia but much of our plastics industry have shut down so most material are now imported from Asia. Safety rules in Asia are not as tight and are regarded by some manufacturers as 'optional', particularly if they cost more money, so unless you are sure that any PVC film abides by Australian rules then best to avoid it.

Some pool liners are made from a rubber (such as EPDM). Rubbers are fundamentally different to plastics as they are cross linked which makes them much more stable.

## **How real is the danger**

In my mind the dangers from toxic chemicals leaching out are minimal, the fact that drinking water is typically delivered through either polythene or PVC pipe would be a far bigger relative potential danger but even here the risk here is minimal.

## **Conclusion**

So to conclude use black polythene film if you want a stabilised version or clear (white not green tinged) if you want it biodegradable in sunlight. Avoid flexible PVC (as is commonly used in cheap swimming pools) but cross linked rubber of the correct grade should be safe.

Hope that helps

Colin