

# Styrene and resicon

## What is styrene

Styrene is primarily a synthetic material which is produced in industrial quantities from benzene and ethylene and classified as a toxin, an irritant and a potential carcinogen. A slightly oily colourless liquid form, it easily evaporates and has a sweet smell although this odour often alters once mixed with other components. It can dissolve in some liquids but is not easily dissolved in water. It is also produced naturally at low levels from some fruits and vegetables.

## Where is it used

Styrene is heavily used, mostly in what is termed a linked form as a monomer to produce plastic based products such as polystyrene, ABS, SBR rubber, unsaturated polyesters etc which in turn are then used in industry to produce items such as vehicle parts, food containers and general plastic products. In our industry it used considerably in polyester and vynilester based resin systems, adhesives and some sealant type products in its unlinked liquid form.

## What happens when styrene enters the environment

For the most part, inert products such as plastic parts, packaging etc. introduce styrene into the environment through the manufacture and disposal processes with evidence of styrene contamination being found in air, water and ground soils. However, in unlinked liquid form it enters the environment quickly and in larger quantities through evaporation and is also further broken down by bacteria found in water and soils allowing further rapid entry. It is not expected to enter the food chain by grazing animals.

## How does it affect humans

Surprisingly, for a fairly commonly used industrial product, little is known about the effects of styrene on us, what we do know to date is that although exposure may not lead to any symptoms at all, breathing high levels of styrene for short periods can lead to possible respiratory problems and nervous system effects such as depression, tiredness, nausea, muscle weakness, ENT irritation. There is currently no test data on the effects of breathing low levels for a long time, nor is any data available on the effects of ingestion or absorption although animal studies revealed various symptoms such as damage to the brain, kidneys, liver and lung along with some reproductive effects.

The International Agency for Research on Cancer and the Environmental Protection Agency has also now determined that styrene could be a possible carcinogen to humans in airborne form and several studies of workers have shown that breathing styrene may cause leukemia. There is no current evidence to support any cancer or health risks for final finished products containing styrene where skin contact or ingestion has occurred.

## To summarise

Clearly, styrene is a toxic, dangerous product in its raw form. It finds its way into the market in either solid form e.g. plastic parts, packing etc. or in liquid form. It is not harmful to humans in its inert solid form although it is harmful to the environment if not disposed of correctly. It is harmful to humans in liquid form both as a finished product and during manufacture.

## So where do we fit in

In the chemical anchor market styrene has always been used in resin systems by most manufacturers as it is both a readily available product and is the cheapest method of formulation. Clearly, styrenated chemical anchor products are high risk as they are always in liquid or certainly semi solid format when supplied. They are most hazardous to both humans and the environment during the installation phase when operators may breath in fumes and semi solid or liquid resins are placed in direct contact with ground and construction elements (drilled holes etc), it should be noted however that they are considered non hazardous in a cured state. Disposal of used cartridges also has an impact environmentally through possible soil entry of the broken down materials.

It would have been completely irresponsible to keep manufacturing and supplying a potentially dangerous product to customers when there are alternatives available and therefore we took the decision some time ago to remove all styrene from our cartridged resin products, this has been achieved by reformulating our resin blends using other components and manufacturing processes to produce an anchor range which is now not harmful to the operators or the environment whilst still maintaining the properties of a high performance chemical anchor i.e. high strength, fast cure, pumpable etc.

You will now find our resicon 2 and resicon 3 products are now totally styrene free, we have also made our resicon 5 product as safe as possible by formulating it in a low odour format and as inert as possible in order to pass WRAS approval for use in drinking water, pure epoxy based systems by nature, are not styrene based but do contain some harmful chemicals, unfortunately if these were totally removed the product would then cease to function as an epoxy anchoring system. It is perfectly safe product when used correctly and our detailed material safety data sheets offer full advice on safe installation and disposal of empty cartridges.

Resicon SI and resicon 7 do still currently contain styrene as this is a requirement for product performance and not simply due to the manufacturing process and we are currently limiting the amounts used where possible whilst retaining high performance function. We are committed to removing styrene from our total product range by Jan 2008 and therefore we hope to have alternative formulations available in 2007 in the meantime we are happy to recommend resicon 2,3 or 5 as an alternative if required.

## How do I recognise a styrenated product

A chemical anchor or resin based product containing liquid styrene will always have a very strong pungent petroleum type odour whereas styrene free products have virtually no smell, the product will also carry a flammable symbol on the label and of course styrene will be listed in the manufacturers MSDS. Styrene free products are usually classed as an irritant only.

## What's in it for us

The short answer is nothing, clearly it is more expensive to manufacture styrene free resins, however we offset the increased costs by the logistical savings on storage, handling and transport of a now non inert and non flammable product no longer requiring special transport certification or storage facilities etc. and therefore there is no cost increase to our customers over standard styrene product. Also we naturally take our environmental and customer responsibilities seriously and we are extremely proud that we are doing the best we can in real terms instead of just talking about it.

If you'd like to know more about styrene or any of our resicon products or have any concerns about using chemical anchors, drop us a line, we'll be delighted to hear from you.