The Lifecycle of Vinyl: Past, Present and Future Harm

What is Vinyl?

Vinyl, also known as "PVC" or "Polyvinyl chloride," is one of the most widely used synthetic materials due to its durability and versatility. Common uses include piping, vinyl siding, vinyl flooring, electrical insulation, windows, toys, medical equipment, cloth and paper coating, packaging, and countless other plastic products.

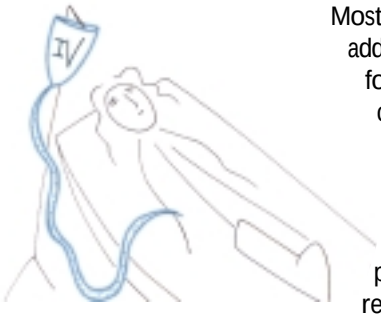
Manufacturing PVC

The problem with PVC can be summed up in two words: TOXIC LIFECYCLE. Throughout its lifecycle, PVC can cause harm. PVC requires hazardous chemicals in its production and very hazardous chemicals, such as dioxin and PCBs, are byproducts of that same production. PVC leaches or releases harmful chemicals in some consumer products, and toxic byproducts, including dioxins, are created when it is burned. The alarming news is that vinyl production is on the rise, despite the fact that safer, feasible alternatives currently exist for almost all vinyl products. The manufacture of PVC can put worker health and fence-line communities at risk through exposure to hazardous chemicals that can cause a number of severe health problems including cancer, endometriosis, neurological damage, immune system damage, respiratory problems, liver and kidney damage, and birth defects.

Fabricating PVC

The basic building block of PVC is vinyl chloride, a simple chemical made of chlorine, carbon and hydrogen. Once this basic building block is manufactured, it is sent to countless fabricating facilities where vinyl consumer products are made. PVC is useless without the addition of a number of dangerous chemical stabilizers, such as lead and cadmium, and phthalates. The fabricators' job includes mixing in the additives and then working the machines that make the pipe, siding, shower curtains, fabrics, toys and other vinyl consumer products. Phthalates make PVC flexible, while lead and cadmium perform other functions related to specific uses.

Consumer use



Most vinyl products are believed to be basically harmless when properly used. However, some of the additives and softeners leach out of certain vinyl products. Although soft PVC toys have been made for babies for years, studies find that these additives leach out of soft toys into the mouths of the children chewing on them. Vinyl IV bags used in neo-natal intensive care units have also been shown to leach DEHP, a phthalate additive. In Europe, phthalate additives in PVC toys for children under the age of three have been banned and in the USA, most companies have voluntarily stopped manufacturing PVC toys for this age group or have eliminated the phthalates. However, alternative softeners have not been adequately tested to determine whether they are safe. Other vinyl products like brand new shower curtains, car interiors, and flooring, to name a few, initially release chemical gases into the air. Some studies indicate that this off gassing may contribute to health complications, but the information on this is sparse and needs further study.

Disposal - Landfill and Recycling

PVC is difficult to recycle for several reasons. First, the high chlorine content in PVC makes recycling complicated and expensive because it cannot be mixed with other plastics. When PVC is heated, the chlorine is released as hydrogen chloride, which turns to hydrochloric acid. If even a small amount of PVC mistakenly finds its way into a non-chlorine based plastic recycling process, the hydrogen chloride can contaminate the entire batch of recyclables, damage the equipment, and make it unfit for recycling. Therefore, PVC has to be separated from the other non-chlorine based plastics. Second, because there are countless varieties of additives in different vinyl products, the recycler is faced with the headache of mixing too many unknown chemicals together and not being able to control the final content of the recycled product. Because of the variety of PVC ingredients in different products, PVC - when recycled - ends up being used to make cheap, low quality products. Given the enormous challenge and narrow profits associated with recycling PVC, most of it ends up either in landfills, municipal incinerators, or simply burned in open pits or backyard burn barrels. The latest landfills designs take into account the variety of fluids that leach out from the waste, but even the latest landfill technology cannot be expected to contain these leachates far into the future. Many of the older landfills have been leaching toxic fluids for decades. These fluids can seep through porous spaces in earth and rock until they reach groundwater where they can travel far from the landfill.

Disposal - Incineration and open burning

Dioxin is formed when PVC is manufactured and when it is burned, either in an incinerator or an open fire. Dioxin is a known human carcinogen and among the most toxic chemicals known. Dioxin released from incinerator stacks travels on air currents, sometimes for very long distances, before eventually falling to the earth to be consumed by animals such as fish, chicken, pigs and cows. Enormous quantities of toxic ash are also created at incinerators and must be treated as hazardous waste. It is estimated that approximately 200,000 tons of PVC is incinerated annually in the USA, leaving behind ash laced with dioxin and toxic additives. There is controversy over how that hazardous ash is handled and what the ramifications will be years from now. And then there is the sobering fact that for many, the cheapest and most convenient way to handle waste is to burn it - without pollution controls - in open pits or backyard burn barrels. This dioxin forming activity occurs throughout the USA and perhaps more frequently in newly industrializing countries around the globe.

Bioaccumulation

Once dioxin enters the environment, it can be carried long distances by the wind. From there, the dioxin molecules are deposited on surface waters, soils and plants where it moves up the food chain, accumulating at higher and higher concentrations in fish, animals and eventually in people. Concentrations of dioxin build up in the fatty tissue of the animals, which are then consumed by people. The evidence bears out since whales, which are high on the food chain, often have high levels of dioxin and other chlorinated chemicals in their bodies. People who consume large amounts of fatty meat, dairy and fish probably get the largest doses of dioxin, but dioxin is also found at lower levels in grains, fruits and vegetables.

Transmission

Dioxin has many sources in addition to the manufacture and incineration of PVC. But when PVC plastic is burned, it directly contributes to the dioxin releases to the environment, which eventually trespass into our food supply. According to the U.S. Environmental Protection Agency, the average American has a body burden of dioxin that is at or near the level where health effects are known to occur. Unborn children are exposed to dioxin in their mother's womb, while breastfeeding infants receive dioxin from their mothers' breast milk. The benefits of breast-feeding outweigh the hazards from dioxin. In fact, breast-feeding is a bonding and nutritional activity without parallel. More extensive studies about the relationship between dioxin exposure and infant health are underway. However, there is no question that the dioxin levels in mothers' breast milk must be greatly reduced. This means that dioxin sources must be eliminated.