# PVC Vinyl Health Hazards

## PVC: CHEAP, BUT DANGEROUS

PVC (polyvinyl chloride, often referred to as "**vinyl**") is one of the most widely-used types of plastic. Its flexibility and cheap cost has resulted in its use in items all around us: in packaging, home furnishings, toys, auto parts, hospital supplies, and a wide range of building materials. As its use has spread, however, it has become the source of some of our most pervasive toxic problems. PVC contaminates humans and the environment throughout its lifecycle—during its manufacture, use, and disposal.

## TOXIC MANUFACTURING

**Dioxins** represent the number one risk from PVC production. Created whenever chlorine-based chemicals are produced, used, or burned, dioxin is one of the most toxic classes of chemicals ever produced. It is cancer-causing in smaller doses than any other chemical known to science. The U.S. EPA suggests that there is no safe level of dioxin exposure. Dioxin bio-accumulates in animal fat (it builds up and increases through the food chain) with its highest concentrations deposited in animal fat and breast milk. Dioxin causes:

- cancer
- endocrine disruption
- compromised immunity
- skin problems such as chloracne
- diabetes
- reproductive problems

In addition to dioxins, typical PVC manufacturing plants release thousands of pounds of other carcinogenic chemicals into the environment each year, including ethylene-dichloride and vinyl chloride. All of these discharged pollutants contaminate nearby drinking water supplies while on-site incinerators spread dioxin and other hazardous compounds into the air. Nearby communities, farms, and fishing areas suffer the consequences.

Most vinyl manufacturing facilities are located in low-income communities, often communities of color. In states like Louisiana, this disproportionate impact is concentrated in poor, mostly African-American communities — making the problem of PVC a classic case of environmental racism.

## UNHEALTHY HOMES & OFFICES

The use of PVC in construction (the largest overall use of PVC) doubled between 1980 and 1995. In the construction industry, PVC is used in pipes, siding, electrical insulation and sheathing, roofing, flooring, wall coverings, windows, and doors. In each of these uses, PVC poses health risks and environmental dangers.

PVC is useless on its own and requires a variety of **additives** to be functional. The two main additives are plasticizers and stabilizers. Plasticizers are used to make the vinyl flexible (as in flooring and tarpaulins). The most common plasticizers are **phthalates**. Stabilizers help slow the degradation of the PVC polymer in either heat or sunlight. Stabilizers found in PVC include **lead, cadmium, and organo-tins** - all potentially toxic heavy metals. Because the additives in PVC are not chemically bound to the polymer, they can be released over time resulting in a range of potential exposures from PVC products in normal use:

- **Lead poisoning:** Lead dust is released from PVC products such as certain vinyl mini blinds, particularly as they deteriorate through exposure to sunlight. Lead has also been found in children's toys.
- **Immune system damage:** Organo-tins have been documented to cause immune system damage in laboratory animals. These additives can leach out of PVC pipes into the drinking water.

- **Asthma** has been linked to phthalates released by vinyl flooring.
- **Cancer** Vinyl chloride is a known carcinogen and has been found to leach from PVC pipes, contaminating drinking water especially in rural water districts, where the water may be piped a long distance.
- **Reproductive problems**: Damage to the developing male reproductive system can be caused by phthalate plasticizers such as DEHP that are absorbed into the bloodstream and cross the placenta.
- **Mold Infestations** can result from the high bacterial and mold counts that have been found in the flexible vinyl in vinyl wall coverings

## FIRE HAZARDS AND TOXIC FUMES

Firefighters were among the first to identify the hazards of PVC as a construction material. Because so much PVC is used in construction and household items, building fires have become increasingly more dangerous for firefighters and building occupants. Although PVC is flame-resistant, it **degrades into hydrogen chloride and at least 74 other chemical products** long before it catches flame. These corrosive gases can spread faster than flames, killing occupants before they have a chance to escape.

In 1998, the International Association of Fire Fighters stated, "because of its majority chlorine content, when PVC burns in fires, two hazardous substances are formed which present acute and chronic hazards to fire fighters, building occupants, and the surrounding community. These are hydrogen chloride gas and dioxin". **Hydrogen chloride gas is lethal when inhaled**. It is not unusual for people caught in building fires to be killed by toxic fumes from smoldering PVC before the flames actually reach them. As builders and policymakers become increasingly aware of the hazards from PVC, more restrictions are being enacted against the use of PVC in building construction.

## TOXIC LEGACY: NO SAFE DISPOSAL

At the end of its lifetime, PVC must be either buried or burned. Buried, it can continue to leach contaminants into groundwater. Burning is even worse, creating and releasing more heavy metals, dioxins and other chlorine-containing compounds that contaminate the air, land and water.

## RECYCLING NOT THE ANSWER

Recycling of PVC plastic is not a solution to either the environmental or health problems created during its production or use. While most plastics do not get recycled, PVC is the least recyclable of all plastics. Because PVC items contain so many different additives, **recycling is expensive and impractical**. Further, because it begins to off-gas hydrogen chloride at lower temperatures than those at which other resins melt, when mixed with other plastics, PVC can also sabotage the recycling of other resins. According to the latest EPA figures, less than 0.5 percent of total post-consumer PVC is recovered for reprocessing. Since PVC is rarely recycled, it either ends up in a landfill or is burned (leading to more heavy metal and dioxin emissions).

## TOWARD A GENERATION OF SAFER BUILDING MATERIALS

The building industry can work to protect construction workers and building occupants from the hazards of PVC.

PVC can be replaced with safer materials in virtually all cases. It is imperative that we make this transition. Substitutes for PVC include traditional materials such as clay, glass, ceramics, and linoleum. In cases where traditional materials cannot be used as a replacement, even chlorine-free plastics are preferable to PVC. See the PVC Alternative Materials Fact Sheet for more information on how to replace PVCs.

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