

# Vinyl chloride

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**In news-** Vinyl chloride, the chemical in several of the train cars that derailed and burned in East Palestine, Ohio, in February 2023 can wreak havoc on the human liver.

## What is Vinyl chloride?

- Vinyl chloride is an organochlorine with the formula  $H_2C=CHCl$ . It is also called vinyl chloride monomer of chloroethene.
- This **colourless compound is an important industrial chemical chiefly used to produce the polymer polyvinyl chloride. It is among the top twenty largest petrochemicals in world production.**

## Its impact on human health-

- It has been shown **to cause liver cancer, as well as a nonmalignant liver disease known as TASH, or toxicant-associated steatohepatitis.**
- With TASH, the livers of otherwise healthy people can develop the same fat accumulation, inflammation and scarring (fibrosis and cirrhosis) as people who have cirrhosis from alcohol or obesity.
- That kind of damage typically requires relatively high levels of vinyl chloride exposure – the kind an industrial worker might experience on the job.
- However, exposures to lower environmental concentrations are still a concern. That's in part because little is known about the impact low-level exposure might have on liver health, especially for people with underlying liver disease and other risks.
- **Vinyl chloride is used to produce PVC, a hard plastic used for pipes,** as well as in some packaging, coatings and wires.
- Its health risks were discovered in the 1970s at a B.F.

Goodrich factory in the Rubbertown neighbourhood of Louisville, Kentucky.

- Four workers involved in the polymerization process for producing polyvinyl chloride there each developed angiosarcoma of the liver, an extremely rare type of tumour.
- Their cases became among the most important sentinel events in the history of occupational medicine and led to the worldwide recognition of vinyl chloride as a carcinogen.
- The liver is the body's filter for removing toxicants from the blood. **Specialised cells known as hepatocytes** help reduce the toxicity of drugs, alcohol, caffeine and environmental chemicals and then send away the waste to be excreted.
- **The hallmark of vinyl chloride exposure to the liver is a paradoxical combination of normal liver function tests and the presence of fat in the liver and the death of hepatic cells**, which make up the bulk of the liver's mass.
- However, the detailed mechanisms that lead to vinyl chloride-induced liver disease are still largely unknown.
- **Recent research has demonstrated that exposure to vinyl chloride, even at levels below the federal limits for safety, can enhance liver disease caused by a "Western diet" – one rich in fat and sugar.**
- This previously unidentified interaction between vinyl chloride and underlying fatty liver diseases raises concerns that the risk from lower vinyl chloride exposures may be underestimated.
- **In outdoor air, vinyl chloride becomes diluted fairly quickly.** Sunlight also breaks it down, typically in nine to 11 days.
- Therefore, **outdoor air exposure is likely not a problem** except with intense periods of exposure, such as immediately following a release of vinyl chloride.

- Vinyl chloride is also dispersed in water.