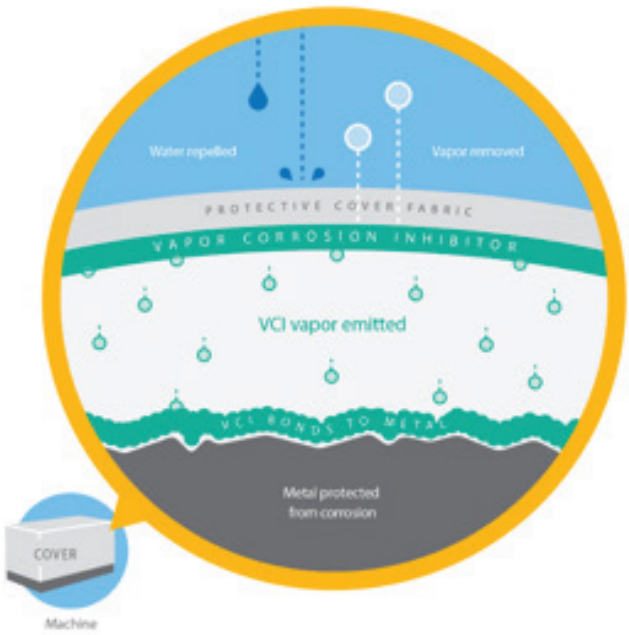
WHAT IS A VCI?

VCI is an acronym for "vapor corrosion inhibitor" or "volatile corrosion inhibitor". A VCI can take the form of a chemical substance or a combination of chemical substances that significantly reduce and prevent corrosion on metals. VCIs are introduced to the protected asset by means of a carrier that works as a source. This can be a liquid, coated paper, compounded film, a tablet, a powder, or an adhesive.

VCI compounds work by vaporizing from the source and forming a thin molecular layer over the surface of the metal in an enclosed space. That molecular layer shields the metal's surface from reacting with environmental elements that typically cause corrosion – such as oxygen. Once a protective film is created on the metal surface, the VCIs keep releasing from the source until there is an equilibrium in the packaging space.

One question that we're often asked often is, are VCIs in packaging safe for humans?



WHAT MAKES A COMPOUND TOXIC?

Toxicology is a field of science that tries to understand the adverse effects that chemicals can have on people, wildlife, and the environment in general.

In relation to human beings, many factors will determine whether a person will have a negative reaction to a chemical compound, some of which are:

- A person's age and current health state
- The dosage of the chemical they are exposed to
- The duration of time that someone is exposed to the chemical
- Routes of exposure – oral, inhalation, dermal

It's important to know your health conditions, and the dosage level, prior to exposing yourself to VCI. People have different reactions to different chemicals depending on their medical history and current condition.

Take regular dish soap as an example; this common household product is safely used by millions of people. However, someone with sensitive skin, or a skin condition, may have a bad breakout/rash when using a certain soap to do their dishes. Similarly, someone with a respiratory or skin condition may be at higher risk when around high doses of VCI.

These factors are important to know before understanding if VCI is indeed toxic to you or your staff. What's the concentration level or dosage of VCI you'll be exposed to? How long will you be exposed and what is your proximity to the VCI? How will you or your staff be handling the VCI? Do you have any underlying health conditions that might be prone to triggering a more negative reaction to VCI compounds?

TOXICITY OF VCI

One method to understand the level of toxicity of VCI compounds is the LD50 model. This is the median lethal dose -- a dose that will kill 50% of an exposed test population -- usually expressed in mg/kg. The higher the number, the lower the toxicity. This data can be obtained from the Safety Data Sheet (SDS) of a chemical compound.

Just to keep things in perspective, even water has a toxicity level that may be fatal at elevated levels of consumption. And as the list above indicates, VCIs can have a lower toxicity level than nicotine and coffee!

COMPOUND	DOSAGE
Table Salt	LD50 = 3,000 mg/Kg in rats (oral)
Nicotine	LD50 = 50 mg/Kg in rats (oral)
Coffee	LD50 = 127 mg/Kg in rats (oral)
Transhield VCI*	LD50 = 1,050 mg/Kg in rats (oral)

ARE VCIS IN PACKAGING SAFE FOR HUMAN HANDLING AND INHALATION?

How VCIs are applied will largely determine their level of toxicity to humans. High doses, or 100% pure samples of VCI compounds in raw form, when inhaled, ingested, or contacted by humans, can be toxic if over exposure takes place for a prolonged period.

When applied in protective packaging products – paper, shrink wrap, paint coatings, desiccants, etc. – VCI compound concentrations typically do not contain a high enough dosage to cause serious harm. And, if you limit the time you spend around the VCI compounds, and your proximity to the substance, you reduce the risk of negative health effects.

Additionally, after the removal of VCI infused packaging (films, paper, coatings, emitters, etc.) the VCI molecules within the packaging space dissipate. There is no major inhalation or contact risks.

If you choose the right product, sourced through a reputable supplier -- and handle the VCI according to supplier's recommendations -- they are safe. If handling a more concentrated dosage of VCI in soluble or liquid form, it's recommended you use the personal protection equipment recommended by the manufacturer – masks, gloves, eyewear, etc.

SOURCES

1"Toxicology." National Institute of Environmental Health Sciences, U.S. Department of Health and Human Services, www.niehs.nih.gov/health/topics/science/toxicology/index.cfm.