



Natural paints

Can the paint I use really make a difference to my health and the environment?

BY ANGELA PETRUZZI

Yes, it most certainly can. By reducing the negative impacts of paints we can end up having a neutral or positive effect on our personal health, the home environment and the environment in general.

Typically, paints are made up of four basic elements: pigments to achieve colour, binders to hold the pigment to the surface after application, solvents that provide the fluid component of paint, and fillers that reinforce the binders and provide texture.

Conventional paints

In conventional paints, pigments are synthetic, binders are normally synthetic petrochemicals such as acrylic and vinyl. Solvents such as mineral turpentine contain high levels of volatile organic compounds or VOCs (a substance which becomes a gas) that can be either oil or water mixable, and the filler can contain numerous 'additives' such as drying agents and anti fungicides that can include formaldehyde. Many paint manufacturers do not include tints, biocides or formaldehyde in their VOC calculations; some colours require tints that are high in VOC content.

Once the paint is applied the solvents evaporate, leaving behind the pigment, binder and some of the additives. This evaporation results in the creation of the 'new paint' smell. Solvents are necessary in paints and oils to allow for easy application; this is where the type and level of VOCs produced is very important.

Unknown to many, conventional solvents used will continue to 'off gas' for a long time, even after the smell has disappeared. It is estimated that more than 80,000 tonnes of VOCs are released annually into the atmosphere above Australia. These VOC emissions,

which are not plant based, contribute to harmful ozone formation and are detrimental to our health. A CSIRO study found higher indoor VOC levels in established buildings compared to outdoor levels, and very much higher levels in new homes.

Inhaling this potpourri of chemicals has also been linked to 'Sick Building Syndrome' - disorders that may cause damage to the kidneys, liver and respiratory system, and lead to headaches, forgetfulness and - in the worst cases - serious brain damage. In Denmark, 'Painters Dementia' is an acknowledged industrial disease caused by excessive exposure to solvents and is recognized for compensation.

It is interesting to note that there are over 100,000 chemical compounds used in building materials and finishes. Unfortunately for us, scientists only know the toxicological data for less than half of these - let alone how they react in combination, or how they affect humans and the environment.

Water-based paints

Paints and varnishes using water as the solvent are often seen as a healthier alternative. Although they are at least a step in the right direction, this usually means that a whole range of chemicals have been added to the paint to replace the functions carried out by the synthetic solvent.

Manufacturers maintain there are no oils in acrylic paints. The main ingredients used for acrylic paints are listed as pigments (P), binders (B), solvents (S) and fillers or additives (F). There are limited further details provided by the manufacturers but there is an admission that the ingredients, apart from water, have their origins in the petrochemical industry.

The following is a list of some ingredients that may appear in conventionally manufactured paints:

Inorganic and/or organic pigment (P); polyacrylate emulsion (B); water (S); extenders, defoamer, coalescent, surfactant, dispersant and thickeners, acrylic copolymer latex (B); titanium dioxide (F); isothiazolinones (F); unregulated filler, lubricating oils - petroleum, ingredients determined not to be hazardous (F).

The comment 'determined not to be hazardous' is not backed up with any further information. Off gassing still occurs for a long time and people living in such surroundings will continue to inhale these toxic chemicals long after the paint job has been completed.

Consider what happens when these paint remnants reach our waterways. They may break down to a degree, but they still cause the waterways to become murky, thereby not allowing the plant life to photosynthesize. These paint particles also become trapped in fishes' gills. How often have we heard in the media of contaminated waterways and dead fish being found? How many painters and DIY hobby painters still wash their brushes down the drain, thinking that 'water-based' means safe to flush?

Ed's note: Wipe excess paint onto newspaper or old rags before rinsing brush in water. Allow water to stand overnight to let the paint solids settle. The clear water can be carefully poured onto the garden (avoid areas near rivers and lakes). Dispose of the residue paint solids.

Water based paint can be left to dry by removing the lid and allowing the paint to harden in an area away from children and animals. Disposal of paint containers via domestic recycling programs may differ between local authorities.

Natural paints

Now for the good news! Natural paints are made up of the same four elements, but use different ingredients. The following list is not product specific but shows the ingredients listed on the websites and product labels of some natural paint manufacturers:

Water (S), chalk (B), casein (B), marble powder (P), porcelain clay (P), talcum (F), borax (B), natural resins (B), zinc oxide (P), iron oxide (P), china clay (P), bentone (P), beeswax (B), beeswax soap (F), methyl cellulose (F), hemp oil (B), linseed oil (B), safflower oil (B), silver chloride (F), diatomaceous earth (F), metal and earth pigments (P), orange oil (S), lemon oil (S) and isoaliphates (S).

The manufacturers of natural paints are also very keen to let people know that their products are recyclable, manufactured under very high environmental standards and are biodegradable.

As people are becoming more aware of the risks associated with conventional acrylic, petrochemical-based paints, many are turning to natural alternatives. 'Green' paints are becoming more popular and more readily available. Europe has led the way in introducing less harmful, plant based solvents in paints and finishes for many years, however they are also using synthetic solvents such as the isoaliphates. Used in the pharmaceutical and food industries, isoaliphates have a very low toxicity and are now well established as paint solvents in European natural

paints. Australia has begun looking at these processes but still has a way to go.

Some benefits of choosing natural, plant based paints with low VOCs are reflected in your health. Reduced toxin loads are good for everyone, not just those that have allergies or sensitivities. The low level pleasant smell experienced during the application of natural paints allows the painted areas to be occupied sooner – with no headaches, dizziness or nausea. The reduced use of synthetic chemicals also lowers water and ozone depleting contaminants, therefore helping reduce our environmental impact. Furthermore, they are fully biodegradable and are not detrimental to our waterways as many of the synthetic water based paints are.

However, it is important to note that for extremely chemical-sensitive people, even some of the 'natural' ingredients like citrus oil or vegetable turpentine can trigger allergies.

A natural choice

Natural and low VOC paints and finishes are now receiving more publicity in the media, not only through 'alternative' magazines but also in 'mainstream' media. Whilst there are slightly higher prices attached to these types of paints and finishes this can be balanced by the benefits already mentioned. It can be further balanced by the high coverage of natural paints; if you compare the price of 1m² painted surface, you'll find that you need much less natural paint than synthetic paint

to cover the area. Not to mention potential medical bills that may occur from using 'conventional' paints and finishes. If the environmental benefits do not sway us to pay a bit more then surely the question, 'What price do we put on our own health?' is a very convincing argument.

Here it is important to note that it is not only the amount of VOCs that is the issue, but the type of VOCs. The VOCs used in natural paints have no or absolute minimal effect on human health or the environment. Again the willingness to disclose this information is a huge bonus for the manufacturers of natural paints.

Conventional paint manufacturers are not willing to reveal their 'secrets' but, as mentioned earlier, do admit to petrochemical origins. The off gassing associated with conventional paints is still an issue even though they have managed to reduce the odour levels.

There is focus on the levels of VOCs used in paints and finishes. This is important but can be diluted by the division of VOCs into different categories. Some of these do not need to be mentioned according to Australian law.

It is therefore important to be aware of the types of VOCs used. The use of water as a natural solvent by all paint manufacturers does help reduce the level of toxic VOCs used. Once again it is the willingness of the natural paint manufacturers to stand firmly behind their products that gives them an

Volatile Organic Compounds

In high school we learned that VOCs are a class of carbon-based compounds that readily become volatile (gaseous) under ordinary (atmospheric) conditions.

According to regulatory bodies, VOCs are organic compounds that readily volatilise under atmospheric conditions *and* that react with sunlight to generate smog. Thus, from a regulator's point of view, compounds are VOCs only if they contribute to certain types of outdoor pollution.

In the green building community, we think of VOCs as contributors to indoor air quality (IAQ) problems – and the amounts of VOCs is often

our only IAQ metric for a product. But there are lots of compounds that meet a chemist's definition of VOC but are not photoreactive so are not defined as VOCs by regulators. Some of these chemicals – including formaldehyde, methyl chloride, and many other chlorinated organic compounds – have serious health and ecological impacts.

Further complicating matters, some VOCs have potentially serious health effects, while others are relatively benign. And the amount or type of VOCs that are in a product may or may not be a good indication of what is released into the air – some react with ozone or with other compounds and morph into something new as they volatilise.

The label describing VOC levels in grams per litre on a can of paint indicates the paint's contribution to smog formation. For indoor air quality purposes, we should look to results from chamber-testing protocols that analyse key VOCs individually.

This explanation comes from Environmental Building News Volume 16 Number 7 – July 2007. EBN is published by BuildingGreen, an independent USA publishing company committed to bringing their members accurate, unbiased, and timely green design information. Articles about VOCs, and many other topics, can be found on their website by using the search facility.

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advantage. They use VOCs that have been researched thoroughly to determine their negative effect on human health and the environment. Such things as isoaliphates and orange/lemon oils are all of food grade quality and used by one European manufacturer in amounts that have no or very minimal negative effect.

The manufacturers of conventional paints seem to let themselves down by being unwilling to discuss their ingredients and the effects these have on human health and the environment.

What to look out for

There are many other technical and chemical considerations to take into account when searching for the right product.

What evidence is there that there are no solvents or other emission producing substances left behind after the drying process? The use of language is quite tricky when looking at product information. For example 'low odour' does not mean 'low VOC.' Some manufacturers are using other chemicals to mask the odour; the VOCs are still there. Some low VOC paint brands have tints that contain high VOCs. When these tints are added to the base coats the low is then negated.

Often the label does not contain much useful information, so do some research. Unfortunately, the labelling laws in Australia still do not require a listing of the ingredients used, let alone the VOC contents of a product, as is required by European law. Obtain a technical data sheet and a material safety data sheet; this is a good place to start.

This is where our level of trust is tested against our motivation to do research. There are many chemicals used that require knowledge of their short and long term effects before an accurate decision can be made. We need to be able to trust the labelling but, given that many producers of conventional paints are minimalists when it comes to labelling, we also need to think a bit harder. Most of the producers of natural paints and finishes are keen for us to have all the information we need. If we check the level of ingredients listed and apply some of the basic information in this article, we are on the way to making an informed choice. A choice that will benefit our health and the environment.

It is now easier to access this information, and the range of low VOC and natural paints and finishes is growing rapidly, making them more

accessible than ever. It is not a hard road to travel and the benefits will, in the long run, make it a very smooth road indeed. Have fun with your next painting project. ■

Angela and her husband Robert's passion is to provide healthier alternatives that work. Livos Australia, 03 9779 3405, www.livos.com.au



• Sick Building Syndrome and Painters Dementia

Sick building syndrome (SBS) is a combination of ailments associated with an individual's place of work or residence. Most of the sick building syndrome is related to poor indoor air quality.

Sick building causes are frequently pinned down to flaws in the heating, ventilation, and air conditioning systems. Other causes have been attributed to contaminants produced by off gassing of some types of building materials, volatile organic compounds, moulds, and the lack of adequate air filtration.

Symptoms are often dealt with after-the-fact by boosting the overall turnover rate of fresh air exchange with the outside air, but the new green building design goal should be to avoid most of the SBS problem sources in the first place, minimize the ongoing use of VOC cleaning compounds, and eliminate conditions that encourage allergenic, potentially-deadly mould growth.

Building occupants typically complain of symptoms such as:

- Headache
- Eye, nose, or throat irritation
- Dry cough; dry or itchy skin
- Dizziness and nausea
- Difficulty in concentrating
- Fatigue
- Sensitivity to odours
- Increased incidence of asthma attacks/appearance of asthma in non-asthmatics

Information derived from Wikipedia, The Free Encyclopedia - <http://en.wikipedia.org>

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For more information on natural paints and suppliers, check out the following websites:

- www.thegreendirectory.com.au
- www.ecodirectory.com.au
- www.ecovoice.com.au
- www.ecospecifier.org

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