

health and safety and overglaze



Fume Booth

Johanna DeMaine shares her knowledge and experience

Health and safety in ceramics is always an emotive issue and I am well aware that it is up to the individual to become acquainted with the potential hazards and the risks associated with the materials and work methods employed. Ultimately we all have to take responsibility for our own actions. For the purposes of this article I will concentrate on the overglaze techniques which use lustres, precious metal preparations, enamels (commonly referred to as China paints) and decals. These techniques all require inorganic powders to be dispersed in a liquid and then fixed onto the glazed surface. Organic additives are widely used in the ceramics industry to adapt products to special needs.

The organic additives for ceramic and glass decoration are called oils or media and can be based on different solvents: water, water soluble glycols and glycol ethers, paraffins, esters, aromatic solvents or terpenes from natural sources. Usually,

mixtures of solvents with different polarity and drying speed are used.

Types of organic additives are:

- Solvents
- Softeners (Phthalates, Dioles, Glycolic ethers and ether acetates)
- Liquefiers (Lecithins, Salts of polycarboxylic acids)
- Suspending agents (cellulose ethers)
- Fixatives (Cellulose ethers, Acrylic resins)
- Defoamers (Silicones)
- Preservatives (Amides, Isothiazolones)

Lustres are precious metal based organic compounds dissolved in a solvent base and combined with resins. Gold and platinum consist of precious metal containing organic compounds combined with other organo-metallic fluxes and resins.



Respirator

The main solvent classifications are listed as:

- Aromatic hydrocarbons
- Hydrocarbons with low content of aromates
- Hydro treated aromatic hydrocarbons (tetraline)
- Alcohols and ketones (propanoles, butanoles, butanones and diacetone alcohol)
- Terpenes (turpentine oil and etheric oils)

Lustres can contain all or some of the following in varying proportions as the various lustre colours all have different formulas:

- Turpentine
- O-dichlorobenzene
- Cyclohexanol
- Cyclohexanone
- Methyl cyclohexanol
- Di-iso-octylphthalate
- Camphor
- White spirit
- Xyleone
- Tetrahydronaphthalene
- Isophorone
- Tetrahydrofurfuryl alcohol

The hazard presented by a substance is its potential to cause harm. The risk from a substance to cause harm depends on the hazard presented by the substance, how it is used, how exposure is controlled, how much of the substance you are exposed to and for how long and how vulnerable you are. Finding out precisely which of the solvents have been utilised is not easily done, as there is a

degree of secrecy within the industry. So it is best to assume the worst case scenario. This has to take into account the health risks associated with a high concentration of noxious fumes – their flammable nature as well as being irritants to eyes, skin and respiratory tract.

The noxious fumes are present during both application and firing. To overcome the inhalation of fumes, ventilation is the key. The dictionary defines ventilation as the operation and equipment involved in supplying confined spaces with the necessary quantity of fresh air. Toxic substances are unstable, poisonous compounds produced by micro-organisms and these toxins can enter the body through skin absorption, ingestion and inhalation. Though some of the materials that produce these toxins are essential to the creation of ceramics, it is not necessary to stop working with them to remain healthy. However, it does mean that a raised awareness and new work habits are essential. Put simply, ventilation means that air is sucked out of the workplace and is replaced with fresh air. How do you know then if your ventilation is adequate? If you are slightly short of breath or have a headache at the end of the work session, the ventilation is definitely inadequate.

The options available can be discussed under the following headings:

- Substitute materials/work practices
- Dilution ventilation
- Local ventilation
- Personal ventilation

Unfortunately, lustres contain solvents and there is no safe way around this apart from switching to reduced lustres. Dilution ventilation means having windows open and a fan drawing the fumes away from the workplace. This is satisfactory if only small amounts of lustre are being used. Local ventilation means a booth constructed over the workplace drawing the fumes away. Personal ventilation is the use of a respirator while working.

My method of protection from fumes is as follows.

I use a resist method whereby I estimate that 90% of my time is spent using lustre resist which is quite inert. The other 10% is the actual application of the lustre, as all the fine lines (apart from some gold pen work) is achieved by resist. I am confident that I am limiting my exposure to lustre.

As well as this I wear a respirator. It is a Norton brand 7700 series silicone half face mask model with 2 N7500-1 organic vapour cartridges. It is extremely comfortable to wear despite the fact that I wear glasses. (These cartridges are not suitable for clay dust etc. For that you need a particulate filter.) However, it is not enough to just wear the respirator – it must be maintained. When you have finished using it the inside must be wiped and then the whole lot stored in a sealed (zip-lock) bag. This extends the life of the cartridges and keeps dust out. The cartridges need to be replaced when fumes can be smelled through the respirator. (Norton has recently been taken over by North Safety Products. A web link to view is <http://www.westernsafety.com/newnorthrespirators/newnorth1.html>)

And I use a fume booth constructed by my husband of acrylic sheeting with aluminium tube corners. It is the size of my worktable and a mistral MWA200P wall exhaust fan removes the air at 167 litres per second.

Also, I am extremely careful about getting lustre onto my skin. If this does happen I remove it immediately with methylated spirits, so skin absorption is a non-event. Ingestion is out of the question as I follow the following safe work practices: do not bite fingernails, put brushes in your mouth, eat, drink or smoke while working. Neither food nor drink comes into my decorating workplace.

Noxious fumes are also present in the firing of lustres as the media in the lustres burns out. This can be very damaging to the lungs. Up to 450°C I do not go into the kiln shed without a respirator. Under no circumstances should kilns be placed inside a dwelling. For enamels I have overcome any health risks by simply making a water-based medium for my use.

This article is not meant to discourage the use of overglaze; rather it is written in the spirit of raising awareness. Knowledge is a powerful tool and by taking responsibility for ourselves and our actions we empower ourselves. By becoming responsible we can work within a potentially hazardous environment in a very safe manner and enjoy our ceramic pursuits.

References

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In 2001, Johanna DeMaine undertook a 10 week Churchill Fellowship research project on Health and Safety issues involved with overglaze as well as the problems encountered in intensive hand decorating techniques.

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