Safe handling of constituent materials used in composite processing

Introduction

When producing composite products, constituent materials such as organic peroxides, fillers and glassfibres, have varying safety considerations. This information describes the generally accepted safety precautions relating to the ancillary materials most commonly used in the composite industry. But, as with UP resins (see Technical Bulletin 1), always consult the MSDS for more specific safety information.

Organic peroxides (catalysts)

Organic peroxides are heat sensitive and thus thermally unstable chemical compounds that have to be stored and handled with great care. They will decompose significantly above certain temperatures, which will vary from peroxide to peroxide. When storing organic peroxides strict rules have to be followed.

Most catalysts used for the curing of unsaturated polyester resins can be safely stored at a maximum 25°C: although some require cooled storage and transportation. Always consult the technical datasheet for the product in question. Organic peroxides are also sensitive to contamination. Dust from trimming, grinding and any other production waste can start a decomposition reaction so always keep containers closed and use clean vessels to decant peroxide. When removing a quantity of catalyst from its container, never put the excess quantity back into the container. Organic peroxides should not be allowed to come into contact with any strong oxidizing agents (accelerators and promoters), strong acids and bases, and metals like copper, brass and even rust. The following guidelines are recommended for the safe storage of organic peroxides:

- Store peroxides in a separate building or structure, away from direct sunlight.
- The storage area should be designed according to local/national requirements.
- Store the peroxide in the original containers and do not use the storage area for discharging operations.
- No other materials should be stored in the same room as organic peroxides.
- Never put unused or surplus peroxide back into its original container.

If in doubt, always consult your local/national authorities and/or supplier of organic peroxides.

Keep peroxides in a separate storage area away from direct sunlight

Spills should always be cleaned up immediately. For cleaning smaller spillages paper or rags can be used, but they must be disposed of in fireproof containers. An inert absorbent material, such as vermiculite, should be used for larger spillages. This should be soaked with water after clean-up, and deposited in a fireproof waste container. If peroxide spills onto working cloths, remove them immediately, and when handling peroxides, eye protection must always be worn. Peroxide splashes into eyes are very harmful, so if this occurs, flush immediately with plenty of water for at least 15 minutes, and always seek medical advice.

Small amounts of residual organic peroxides can be used to gel and cure resin waste in a controlled way. Larger amounts can be destroyed through controlled burning, but must be treated according to local regulations and instructions. Peroxide waste must not be stored in closed or air-tight containers. As a general rule, empty peroxide containers should be treated as special waste, and local authorities should be consulted in this respect.

Accelerators and Promotors

Various accelerators and promoters, like cobalt compounds, tertiary amines etc, should be handled carefully. Always consult the MSDS for safety information. Accelerators and promoters can react violently with organic peroxides, so keep these products away from direct contact with organic peroxides, and don't store peroxides and accelerators in the same area.

When preparing the resin, always add the accelerators and promoters first and stir carefully. Add the peroxide as the last component.

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Cleaning Solvents

In the composite industry, acetone and methylene chloride are commonly used as cleaning agents. Acetone is frequently used because of its excellent cleaning and solubility properties. But being a highly flammable liquid, storage and handling should follow national/local regulations. Methylene chloride is classified as a possible carcinogen, so it should be avoided whenever possible. Suitable skin and eye protection should always be worn when using acetone and containers must be kept tightly sealed and stored upright to prevent leakage.

Keep waste cleaning agents in closed containers to avoid evaporation. Acetone is regarded as special waste and must be handled and treated as such, according to local requirements. When regenerating acetone by distillation, be aware that the residue after distillation has to be treated as special waste according to local requirements.

Alternative cleaning solvents to acetone and methylene chloride are available nowadays. These cleaning agents can either be water-based types, or non water-based. They do not require any special storage precautions but should, as a general rule, be stored in a separate well-ventilated room.

Fillers

Filler materials should be treated with care. Since they have a tendency to pick up moisture, the storage area for such materials should be dry and clean. The normal fillers used in the composite industry are regarded as inert materials, and can accordingly be treated as inert waste. But always consult the MSDS for the specific filler type for any possible restrictions.

Glass fibre.

Glass fibres must be stored under dry conditions to prevent moisture pick-up. Glass fibre can be a skin irritant, so suitable skin and respiratory protection should be worn when handling the materials. Normal glass fibres used in the composites industry have a fibre diameter well above the critical inhalation diameter of three microns.

Composite dust

During cutting, drilling and sanding composite products, dust can be generated which may consist partly of particles with a size well below three microns. These very fine dust particles can penetrate deep into the lungs when inhaled and may create lung damage.

In many countries legal limits are set on the maximum fine dust concentration in the workplace atmosphere. Always use dust extraction equipment that is able to remove these fine dust particles from the air. National legislation should be referred to for compliance details.

Always use skin and respiratory protection suitable for fine dust environments. Under certain conditions, composite dust may be sensitive to dust explosion. It has been observed that waste dust from DCPD resins can self-ignite. It is advised therefore to dampen waste dust in the collection bins of the ventilation equipment and to keep the bins clean and empty.

Water-based cleaning systems require no special storage precautions.

A wide selection of respirators and particle masks are available to give the required degree of protection against solvents and airborne particles.

PlasticsEurope
Avenue E. van Nieuwenhuyse 4
B-1160 Brussels, Belgium
Telephone + 32 2 676 1732
Fax +32 2 675 3935
Email info@plasticseurope.org
www.plasticseurope.org