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**MADISON CHEMICAL
INDUSTRIES INC.**

InfoTech Bulletin #6

**Product Safety Aspects
Of
Madison Polyurethane Coatings**

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Introduction

Over the years, we have all come to share a growing concern about the safety aspects of commonly used industrial chemicals. This concern arises over the possible toxicity of the raw materials and sometimes the finished products as well. Toxicity is broadly defined as the ability of a substance to harm a living organism, temporarily or otherwise.

Building on more than 30 years of coatings experience, Madison has developed expertise in the areas of epoxies, acrylic and other technologies. Having said that, we remain best known for our world-leading competency in the field of Polyurethanes. Thus, the focus in this bulletin is on polyurethanes.

Personal Safety

In their finished form, polyurethanes represent no environmental risk or hazard. For example, polyurethane coatings are widely used and approved for the lining of water storage tanks and water pipelines. Madison has a number of NSF listings for use in contact with potable water and food. Many children's toys are made from polyurethane resins. There are a number of medical implants that are made from polyurethanes as well.

The situation with regard to polyurethanes in their liquid form is a little more complex. In most polyurethane products available in the market today, the two active ingredients are: isocyanate and polyol. Polyols are essentially non-hazardous. Isocyanates are classed as having "a low order of toxicity" because there is no evidence that they can cause permanent harm or injury. Isocyanates are not carcinogens or mutagens.

However, isocyanates can cause temporary reactions that are similar in nature to the symptoms associated with asthma. This asthma-like reaction occurs when the person inhales what is called "free isocyanate" or "isocyanate monomers" which are evaporating from the material, most likely when it is being atomized (spray-applied). One specific type of isocyanate technology, commonly called TDI, contains significant amounts of isocyanate monomers and has a very high vapor pressure (atomizes easily). This type of technology is seldom used in the coatings world because the chance of a respiratory reaction is quite high. More commonly in coatings, a technology known as MDI is used and it has a very low tendency to enter the vapor phase. Madison does not use, and never has used, TDI in the formulation of coatings. In addition, Madison, as part of its manufacturing process, puts all of its resins through a pre-polymerization process which is designed to remove all free isocyanate monomers from the system.

What is pre-polymerization? This is a kind of cooking process during which the resins are partly reacted but remain in liquid form. In the end result, the chance of an asthma-type reaction is very low. In the unlikely event of a reaction, the solution is to remove the person from the spray area and the symptoms will disappear with no on-going harmful effects. In summary, Madison's products are pre-reacted so that the potential health concerns with isocyanates are avoided.

It should be noted that constant exposure without the proper safety equipment could cause these symptoms to appear in a person who was not initially showing this kind of allergic reaction. This is called "sensitization".

As far back as 1980, Madison Chemical was conducting tests in cooperation with the local Department of Labour in order to analyze a representative group of Madison products for monomeric isocyanate. These tests show that no monomeric isocyanate was detectable. Routine tests are performed on a periodic basis in order to ensure that this is still the case.

Ironically, as experience shows that polyurethane technologies are quite safe, there have been growing concerns about epoxies and polyesters. Both of these products are shown to contain carcinogenic ingredients. This, however, is beyond the scope of this commentary and users of epoxies or polyesters in large quantities should pursue their safety concerns with their suppliers.

Although most Madison products are solvent-free, some of our mix-and-apply formats and our PreCatalyzed formats do contain various solvents. It is possible to get a variety of reactions from those solvents. Most typical would be a skin rash when exposed to the materials in the form of having the coating come in contact with the arms and hands of the applicator.

In brief, although Madison polyurethane coatings do not appear to be capable of causing permanent harm to human beings, they can and will cause asthma-type reactions in a small percentage of the population.

A further consideration is eye irritation. What happens if these resins are splashed into the eyes of an operator or bystander? This would cause temporary irritation and the eyes should be thoroughly rinsed with cool tap water for at least 15 minutes. The irritation may continue for a number of hours but will disappear in due course.

In order to minimize any possible affects from the applying of coatings, it is recommended that the applicator wear coveralls and rubber gloves. High performance coatings are very hard to remove from the skin because they are chemically-curing resins and not simply paint in the normal sense of the word. In confined areas, a fresh air mask is to be used. In open areas or properly designed spray booths, a cartridge-type facemask with a charcoal filter is

sufficient; make sure to use the type that is approved for organic vapors. In the event that a person shows an allergic reaction, these safety guidelines have probably not been followed and should be strictly adhered to. If the reaction persists, this indicates that the person is inherently allergic to these types of products and he or she should be removed from the spray area.

Flammability

Quite separately from the issue of toxicity, we must be cognizant of worker safety from the viewpoint of flammability and explosibility. Most Madison coatings do not contain solvents and are classified as non-flammable. In fact, most of them are “green-labeled” for purposes of the U.S. Department of Transportation and most of the international codes with respect to air travel. Those products that do contain solvents usually have a lower concentration than you would find within the paint and coating industry generally. However, they do not have the same green label designation as the products that are solvent-free. Your Madison representative can advise you as to which category your particular products fall into. We recommend that all products be applied in a positively ventilated area, that there be no smoking or open flames present in the area and that explosion-proof lighting be used in confined spaces. These precautions should be followed even where the product you are spraying is solvent-free and is categorized as being non-flammable. Sparks should be avoided; be mindful of the fact that sand-blasting causes sparks as do electric motors and static electricity.

Disposal considerations

Finally, the possible problem of waste disposal must be considered. With regard to most Madison products, the A and B ingredients can be mixed together to form a solid, which is classed as being non-hazardous and can therefore be disposed of as ordinary waste. PreCatalyzed products will cure when exposed to the air for several days or weeks and can be disposed of in the same manner. We discourage disposing of products while they are in their liquid state unless they are being sent to an appropriate waste disposal company.

Safety is extremely important to us at Madison. If there are any other inquiries, please contact your Madison representative for further particulars.

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