ISOCYANATES

Questions and Answers About Use and Handling in Coatings Applications

Product Safety and Regulatory Affairs Department
Bayer Corporation
Revised May 2002

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Section I:

TLVs, PELs, Manufacturers' Guidelines and How to Know Whether Your Operation Meets or Exceeds These

1. Question: What is a TLV?

Answer: TLV stands for Threshold Limit Value. These values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect. They are guidelines that are recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). TLVs are based on the best available information, but they should **not** be regarded as fine lines between safe and dangerous concentrations. They are **not** a relative index of toxicity. Some individuals may be unusually susceptible and may react to concentrations lower than the TLV. For example, an individual may become "sensitized" to certain chemicals such as amines, epoxy resins or isocyanates and may react to concentrations below the TLV. Therefore, a TLV may not protect a sensitized individual. (See Section IV, Question 2).

For a more complete description, please read the current issue of **Threshold Limit Values and Biological Indices** published by the ACGIH (1330 Kemper Meadow Drive, Cincinnati, OH 45240; phone: 513-742-2020). These are commonly referred to as TLV booklets and are revised and published each year.

2. Question:
What is a PEL?

Answer: PEL stands for Permissible Exposure Limit. This refers to airborne concentration standards established by the Occupational Safety and Health Administration (OSHA). These can be found in Title 29 of the Code of Federal Regulations (CFR), Section 1910.1000, or in one of the chemical-specific OSHA regulations. PELs are legally binding. Because many PELs are based on the ACGIH TLV, they are subject to many of the same limitations discussed in Section I, Question 1. For example, compliance with a PEL may not protect a sensitized worker.

Some states administer their own OSHA programs. These states sometimes issue PELs which may differ from those established by federal OSHA.

3. Question:
What is a Manufacturer's Exposure Guideline?

Answer: Some chemicals used in the workplace do not have a published TLV or PEL. For some of these, the manufacturer has suggested an airborne concentration guideline for worker exposure.

4. Question:
What is the best source of information concerning TLVs, PELs or manufacturers' guidelines for Bayer's isocyanate products?

Answer: The current issue of the Bayer material safety data sheet (MSDS). It is available by calling the Product Safety Department at 412-777-2042.

5. Question:
As a user of a coating system containing isocyanates, can I know if I am being overexposed?

Answer: If you have isocyanate-caused eye irritation or respiratory irritation, you are probably being exposed to a concentration greater than the allowable limit. If you experience no effects, you still **may** be overexposed. The isocyanates have poor warning properties in that you cannot tell by your senses alone when you are exposed to levels exceeding the allowable limits (TLV, PEL or manufacturers' guidelines). For isocyanates, these values are lower than the odor threshold (lowest level at which it can be smelled) or the level at which irritation occurs.

6. Question:
Does Bayer assist a customer or enduser who needs help performing monitoring?

Answer: Yes. Requests for such assistance should be directed to your Bayer technical, sales or marketing representative. If you are unable to identify your Bayer contact, you can call directly to the Product Safety Department at 412-777-2867.

Section II:
Chemical Nature of Isocyanate Products

II

1. Question: What is an Isocyanate?

Answer: An isocyanate is any chemical that contains at least one isocyanate group in its structure. An isocyanate group is a group of atoms containing one nitrogen atom attached by a double bond to one carbon atom, which in turn is attached by a second double bond to an oxygen atom (-N=C=O). A chemical containing two such groups is called a diisocyanate. Common examples are toluene diisocyanate (TDI), hexamethylene diisocyanate (HDI), isophorone diisocyanate (IPDI), and diphenylmethane diisocyanate (MDI). These also are often called monomers because they can be made to react with one another and various other chemicals to form large chain-like chemicals called polymers. Polyisocyanates such as *Desmodur* N are intermediate in size between the small diisocyanate monomers and the very large polymers.

2. Question: Is there cyanide in isocyanates or is cyanide given off during the normal use of isocyanate products?

Answer: Although the two chemical names are similar, no cyanide is used to make or is present in isocyanate products from Bayer. In addition, no cyanide will be released during the normal use of isocyanate products. However, cyanide can be produced from isocyanates by heating to decomposition and/or burning. In fact, burning any nitrogen-containing material, even those that were not made from isocyanates, can produce some hydrogen cyanide. Some examples of these nitrogen-rich materials not made from isocyanates are: epoxy/polyamide coatings, melamine coatings, alkyd urea coatings, and even natural materials such as wool.

3. Question:
Is "urethane" used to make polyurethane coatings (often commonly called urethane coatings)?

Answer: No. "Urethane" is actually ethyl carbamate, a low molecular weight molecule with the Chemical Abstract Service Registry number (CAS#) of 51-79-6. It is not used in the manufacture of Bayer resins for polyurethane paints, nor is it a byproduct of their manufacture or use. Thus, it is not present in these resins even as a residual. In addition, ethyl carbamate (urethane) is not used in polyurethane paints.

4. Question:
Why are hardeners used and are isocyanate hardeners the only ones that can cause health effects?

Answer: For a coating to have good properties and low-temperature curing, a material with some chemical reactivity is needed to act as a hardener. Things that have chemical reactivity tend to have biological reactivity and toxicity. This is true for polyisocyanate-containing hardeners as well as for non-isocyanate hardeners. To distinguish between the hazards of using the various hardeners, the user must carefully examine and compare the information presented on the material safety data sheets and labels, and should probably also discuss the product properties with the supplier's product safety representative.

5. Question:
Is methyl isocyanate, which was involved in the Bhopal disaster, used in paints?

Answer: No. Due to its high volatility and extreme toxicity, methyl isocyanate could not be used in paints. (See Section III, Question 1). It is used as an intermediate in pesticides manufacturing. When nitrogen-rich materials, such as isocyanates or polyurethane paints, are decomposed under high heat conditions, however, recent test results have shown that methyl isocyanate may be generated. See Section VIII for further information.

Section III:
Physical Properties of Isocyanate Products

III

1. Question: How do the various isocyanate products compare with regard to speed of evaporation (also called volatility)?

Answer: It should be mentioned first that all isocyanate products used in coatings applications evaporate slowly, at rates from hundreds to thousands times slower than other liquids, such as water or organic solvents. Among isocyanates, HDI and TDI evaporate faster than the other isocyanates listed below. Isophorone diisocyanate is in the group which would evaporate more slowly. Products classified as very slow to evaporate are MDI (*Mondur* M); polymeric MDI (*Mondur* MR and MRS); MDI polyisocyanates such as *Desmodur* E-28, XP-7038, E-22 and E-23; *Desmodur* W diisocyanate; HDI polyisocyanates such as the *Desmodur* N products; and TDI polyisocyanates such as the *Desmodur* CB products. In fact, the HDI- and TDI-based polyisocyanates originally were developed to reduce the evaporation rate and thus to decrease the inhalation hazard during handling and use.

To illustrate the great difference in speed of evaporation, one can compare the room temperature vapor pressures of various materials. On a relative scale, if MDI is assigned a value of 1, the ease of evaporation (vapor pressure) numbers would be:

Desmodur N Polyisocyanate
Isocyanurate trimer 0.00052
Biuret. 0.93
Mondur M (MDI) 1
Mondur MR (polymeric MDI). 1
Desmodur W diisocyanate (HMDI) 1
Desmodur I diisocyanate (IPDI) 48
Desmodur H diisocyanate (HDI). 1,100
Mondur TD-80 diisocyanate (TDI) 2,500
Water. 1,800,000
Solvent (Methyl ethyl ketone) 9,100,000
Methylisocyanate* 34,800,000

(*NOT a paint ingredient)

2. Question:
Are isocyanates dangerous when they are carried about in open containers at room temperature or during room-temperature pouring or mixing operations?

Answer: Yes. First of all, care must be taken to prevent splashing onto the skin or into the eyes when any such open processing or use operation is taking place.

From the standpoint of inhalation potential, the types of operations described in this question have a lower degree of hazard when the isocyanates involved are those which evaporate slowly, like MDI, MDI-based polyisocyanates, *Desmodur* W or the low free monomer polyisocyanates such as *Desmodur* N and *Desmodur* CB. Air sampling during many such operations has shown a low probability of airborne isocyanate concentrations exceeding the applicable TLV, PEL or manufacturer's guideline.

However, if the materials involved are the more volatile free monomer TDI (*Mondur* TD, TD-80 or TDS) or free monomer HDI (*Desmodur* H), open transfer of these materials at room temperature can result in airborne concentrations above the TLV or PEL. Therefore, care must be taken to prevent inhalation overexposure.

3. Question: Are isocyanates dangerous when spilled?

Answer: Yes. Spills of free monomer TDI or HDI are particularly hazardous with regard to inhalation because even at room temperature such spills can result in airborne concentrations above the TLV or PEL. In addition, care must be taken to prevent skin or eye contact.. This is especially true with *Desmodur* W diisocyanate, which is a strong skin irritant and sensitizer.

Inhalation hazard varies depending on many factors, including how easily that particular isocyanate evaporates, the volume of material spilled, how large an area is covered by the spilled material, the temperature of the spilled material, and the amount of ventilation.

Because it is hard to predict all of these factors, it is best to institute a standard spill cleanup procedure for all isocyanate spills. (See Section VII, Question 1).

Section IV:
Health Effects of Isocyanate Overexposure

1. Question: What are the major human health effects of overexposure to isocyanate products?

Answer: Overexposure to isocyanate products can cause skin, eye, nose, throat and lung irritation. It can also lead to skin or lung sensitization. A third effect for which there is some evidence is a chronic (long-term) loss of lung function. For a more complete list of health effects and symptoms, material safety data sheets for the specific isocyanate products to be used should be consulted.

2. Question: What is sensitization?

Answer: Sensitization is the body's hyperreactive (allergy-like) response to a substance which has been touched or inhaled by a susceptible individual. Sensitization may develop as a result of a large single overexposure, for example, from a spill or accident, or from repeated overexposure at lower levels. A sensitized individual may then respond with asthma-like symptoms or skin reactions upon subsequent exposure to the same or even lower levels. For example, respiratory (lung) sensitization can result in an asthmatic response to future airborne exposures, even at levels below the TLV. Symptoms may include coughing, wheezing, tightness in the chest and shortness of breath. The skin sensitization reaction may include rash, itching, hives and swelling of the arms and legs.

3. Question:
If people become sensitized, can they lose their isocyanate sensitivity after being removed from further exposure?

Answer: Sensitization can be either permanent or non-permanent. There have been documented cases in which individuals have lost their sensitivity to isocyanates based on direct challenge testing at levels below allowable limits. However, since such individuals may have increased susceptibility to isocyanate sensitization, they should have no future contact with isocyanates.

4. Question:
Can sensitization be caused by skin contact or only by inhalation?

Answer: Skin contact with diisocyanates can lead to skin sensitization in some individuals and inhalation exposure can lead to respiratory sensitization in some individuals. In addition, there is some evidence from animal testing with diisocyanates that skin exposure can result in respiratory sensitization.

5. Question:
Is there any way to prescreen individuals to determine if they are likely to become sensitized to isocyanates?

Answer: While there are some preexisting conditions which should preclude certain people from working with isocyanate products (for example, chronic lung disease), there is no simple test which can be done to identify people most susceptible to sensitization. Rather, emphasis should be placed on keeping all workers' exposures consistently below the TLV, PEL or manufacturers' guidelines.

6. Question:
If a sensitized person (lung sensitization) is exposed to isocyanates, will the reaction be immediate or delayed?

Answer: Some will react immediately, some will not react until several hours after the exposure, and a third group will have both the immediate and delayed reactions.

7. Question:
Can exposure to isocyanates cause asthma?

Answer: Yes. Overexposure to isocyanates can cause sensitization which, in turn, can produce asthma. People who have been exposed to a single large concentration, or repeatedly exposed at even lower levels (above the TLV, PEL or manufacturers' guideline), may develop isocyanate sensitization. This, in turn, may cause them to react to future exposures at very low levels, even below the levels that may be considered safe for others. In addition, there are reports that sensitized persons can develop a reactive airways condition which causes them to have asthma-like reactions from exposures to agents other than isocyanates. According to some reports, this condition may persist for several weeks, months or years after removal from further isocyanate exposure. There is some evidence that the sooner a sensitization condition is identified and the person is removed from work with isocyanate products, the less likely that individual will be to experience the long-term reactive airways condition.

8. Question:
Can isocyanates cause sterility, birth defects or reproductive problems?

Answer: Bayer is not aware of any scientific animal or human evidence that isocyanates cause sterility, birth defects or reproductive problems. Tests using animals show no indication that inhalation exposure to diisocyanates can result in sterility or birth defects, and that reproductive problems in general can be avoided by preventing toxicity to the mother.

9. Question:
Do isocyanates cause cancer?

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Answer: There is no evidence that diisocyanates cause cancer in humans. Animal testing has shown that nearly lifetime inhalation exposure of rats to HDI vapor did not cause cancer. Similar studies in which rats were exposed to an aerosol of MDI at elevated levels resulted in a small number of lung tumors. Rats given TDI directly into the stomach via a tube produced tumors, but a study more relevant to potential human exposures, i.e., a lifetime inhalation exposure study with rats, did not result in tumors.

10. Question:
Is it true as a general rule that aliphatic diisocyanates are safer to work with than aromatic diisocyanates?

Answer: No. Comparisons of relative toxicity and hazard among chemical groups are very complex. The answers depend on comparisons of innate toxicity (ability to harm under a given set of test conditions), risk (probability of injury in a particular type-of-use situation), what end point is involved (e.g., irritation, sensitization, oral toxicity, etc.), and physical properties (e.g., speed of evaporation). When all of these factors and others come into play, it cannot be stated generally that aliphatic isocyanates are safer to work with than aromatic isocyanates.

Section V:
Avoiding Isocyanate Overexposure

1. Question: How can isocyanate overexposure be controlled?

Answer: Good engineering controls such as exhaust ventilation and enclosure of the operation where possible are the primary methods of control. In some cases, however, additional precautions such as the wearing of personal protective equipment (PPE) may be necessary. Clothing and gloves (nitrile, neoprene or butyl rubber gloves are recommended, preferably of an intermediate thickness, e.g., > than 10 mils), as well as respiratory protection are often needed in addition to engineering controls. This is especially so in end-use application involving spray painting. If workplace air has not been monitored and the isocyanate level is not known, then an air-supplied respirator with a full facepiece or hood that is operated in a positive-pressure, pressure-demand or continuous flow mode must be worn. Because respirator guidelines can differ somewhat depending on the product involved, the reader is referred to the specific product's material safety data sheet for further guidance, or to the Bayer Product Safety Department: Call 412-777-2867.

2. Question: Where can air-supplied respirators be obtained that are suitable for use with polyurethane applications?

Answer: There are a number of companies that sell these respirators. Partial list: Bullard, Willson, Pro-Tech, 3M, MSA, North, Scott.

3. Question:
How can fresh air be supplied to such respirators?

Answer: For large-volume, fixed-location uses, the best air source is probably plant compressed air made respirable by filtration through a filter system designed to deliver Grade D breathing air. This type has the advantage that the pressure is sufficient to operate an air-cooling device (vortex) to increase worker comfort. A partial list of filtration system suppliers includes: Draeger, Enmet, 3M, Scott, MSA.

For more intermittent uses where compressed air is unavailable, a free-air (ambient air) pump may be a better choice. Because the air is not compressed, oil mist and carbon monoxide are not present as long as the air inlet is in a clear air area.

4. Question:
Should work clothes be left at work and decontaminated or discarded after they have been worn while working with isocyanate products?

Answer: Work clothes should be left at work and decontaminated or discarded after they have been worn while working with isocyanate products. A clothing procedure such as this is a prudent precaution when working with any chemical. Work clothes with minimal isocyanate (not *Desmodur* W diisocyanate) contact can be decontaminated by washing with soap and water. The water itself will react with the isocyanate to produce polyureas which have much lower toxicity than that of isocyanates. Large spills on clothing may result in a hard polyurea coating forming on the clothing. This may make the clothing unfit for reuse.

***Desmodur* W:**

Because of its strong skin irritation and sensitization potential, *Desmodur* W must be handled even more carefully. After handling *Desmodur* W diisocyanate, or applying systems which contain residual *Desmodur* W, all protective clothing must be carefully removed to avoid skin contamination. All reusable clothing and equipment must be decontaminated immediately. If the protective suit is reusable, a helper should decontaminate the suit prior to its being taken off. Any disposable protective equipment should be promptly and properly disposed of as contaminated waste. If personal clothing is contaminated, the clothing should be removed and carefully discarded as contaminated waste. Under no circumstances should clothing or equipment contaminated or potentially contaminated by Desmodur W be taken home by a worker.

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Desmodur W diisocyanate is not as reactive as many of the other commonly used diisocyanates, and therefore, it is more persistent than many other diisocyanates. It may remain in the work area and on protective clothing, equipment and other objects several hours, or even days, after completion of the operation.

A commercially available surface contamination wipe test kit has been evaluated by the Bayer Corporate Industrial Hygiene Laboratory for determining if a surface is contaminated with Desmodur W. The kit may be useful in any situation where decontamination of a surface is necessary. When used according to the manufacturer's instructions, a chemical reaction – resulting in color development – takes place on a treated pad after it has been wiped on a surface. The color indicates that residue of reactive Desmodur W was present on the wiped surface. The kit may be purchased from Colormetric Laboratories, Inc. Des Plaines, Illinois; Phone: 847-803-3737 (www.clilabs.com). SKC, Inc. is a CLI distributor and this equipment is also available from them by calling 1-800-752-8472 (www.skcinc.com). Additional information about the wipe test kit may be obtained by contacting a Bayer Product Safety Industrial Hygienist at 412-777-2867.

Anyone intending to use Desmodur W or a product containing Desmodur W must read and become familiar with not only the material safety data sheet, but also the Bayer brochure: Health and Safety Information: Desmodur W; Dicyclohexylmethane Diisocyanate.

Section VI:
First Aid

1. Question:
What should be done if an isocyanate comes in contact with a person's eyes?

Answer: Flush with large amounts of lukewarm water for at least 15 minutes, holding eyelids open all the time. Refer the affected individual to an ophthalmologist or other physician for immediate follow-up.

2. Question:
What should be done if an isocyanate contacts a person's skin?

Answer: Remove any contaminated clothing immediately. Wash affected areas thoroughly with soap and water for at least 15 minutes. Wash contaminated clothing thoroughly before reuse. For severe exposures, the affected person should get under a safety shower, using the flushing action of the water to remove the bulk of the chemical, then remove contaminated clothing and wash skin with soap and water. Seek medical attention. For lesser exposures, the individual should seek medical attention if irritation develops or persists after the area is washed. If the isocyanate contacted was *Desmodur* W, after the first 15 minutes of washing with soap and water, the affected skin should be covered with a polyethylene glycol (300-500 molecular weight), which will help with the removal of the isocyanate from the skin, and washed again immediately with soap and water to thoroughly remove the polyethylene glycol and residual isocyanate.

3. Question:
What should be done in case of inhalation exposure to an isocyanate?

Answer: The person should move to an area free from risk of further exposure. Oxygen or artificial respiration should be administered as needed. The person should obtain medical attention. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Treatment is essentially symptomatic. A physician should be consulted.

4. Question:
What should be done if a person ingests (swallows) an isocyanate material?

Answer: Vomiting should NOT be induced. The person should drink 1 to 2 cups of milk or water. BUT NOTHING SHOULD BE GIVEN BY MOUTH TO AN UNCONSCIOUS OR CONVULSING PERSON. A physician should be consulted.

Section VII:
Spill Cleanup and Disposal of Isocyanate Wastes

1. Question:
What is the normal cleanup procedure for spills? Is the cleaned-up material a hazardous waste?

Answer: Spill Control Procedure

Overriding Principle: Protect people first, then prevent or minimize any environmental releases, and, finally, protect property and product.

1. Identify material(s).

2. Evacuate area and remove ignition sources
   – Size of evacuation area depends on type of material, temperature and size of spill.

3. Notify superior and others as necessary.

4. Put on Personal Protective Equipment (PPE)
   – Respirator (consult MSDS)
   – Face and eye protection
   – Permeation-resistant gloves
   – Permeation- resistant suit

5. Control source (where applicable)

6. Dike the spill (where applicable)

7. Absorb and decontaminate*
   Oil-dry or similar absorbent
   Decontaminating solution (the following is recommended)**
   – 20% Dow Tergitol TMN-10 or other nonionic surfactant which is liquid and mixes well with water
   – 80% water

**Steps 7-13 are for small spills (10 gallons or less). For larger spills, call the supplier for assistance prior to Step 7.*

If the spill involves Desmodur W, a combination degreaser/monoethanol amine/ water solution is recommended. Read* ***Health and Safety Information: Desmodur W; Dicyclohexylmethane Diisocyanate *for a detailed clean-up procedure.*

8. Remove, treat and discard absorbent/ decontaminant mixture.

– After 15 minutes, shovel absorbent into steel drum and place outside, covered loosely, for 72 hours to allow completion of the reaction of all isocyanates.

This material may be a hazardous waste. For example, it may have a flash point less than 140°F if it contains an organic solvent. The isocyanate reacts with the water to produce a low-toxicity polyurea. However, if the material spilled is a listed hazardous waste (e.g., TDI), cleanup residues and spent decontamination solutions are also hazardous wastes.

9. Decontaminate surface

– Scrub with more decontaminant solution.

10. If the spill was monomeric TDI or HDI, the air should be sampled to ensure adequate dilution before normal operation resumes.

– Paper Tape Monitors

– Scott/Bacharach GMD Systems (Sure-Spot Test Kit) or Zellweger Analytics MDA Scientific paper-tape monitor.

11. Decontaminate and remove protective equipment.

12. Return to normal operation.

13. Do accident investigation.

2. Question:
What disposal method does Bayer recommend for isocyanate product wastes?

Answer: Bayer recommends incineration as the most cost-effective, technically-feasible destructive technology.

3. Question:
Is it true that drums which contain isocyanate products are themselves hazardous waste?

Answer: Drums that contain material which is a listed hazardous waste or is hazardous by characteristic are themselves hazardous wastes, unless they are deemed **legally "empty"** in accordance with 40 CFR Section 261.7. For example, a drum that contained TDI and is not "empty," would be considered a hazardous waste.

4. Question:
When is a drum that contained a hazardous waste considered empty?

Answer: An empty container is one that is "drip dry" – i.e., one that has been emptied of all materials which can be removed using the practices commonly employed to remove materials from that type of container, e.g., pouring, pumping or aspirating. Note that the "one inch" residue rule for determining whether a drum is empty applies only to non-flowable products (e.g., very viscous resins).

Drums that contain an acutely hazardous waste must be triple rinsed. [Acutely hazardous wastes are listed in 40 CFR Sections 261.31 and 261.33 (e).] However, none of the isocyanate-containing coating raw materials from Bayer is listed as an acutely hazardous waste.

For the Environmental Protection Agency (EPA) definitions of empty containers, see 40 CFR Section 261.7. Applicable state laws and regulations should also be consulted.

5. Question:
Should drums be given, donated or sold to anybody?

Answer: We strongly recommend against this. It is the responsibility of the emptier to ensure that drums are transferred to a responsible party who will either properly recondition or destroy (e.g., puncture, crush) them to prevent reuse. Indiscriminately discarded drums could be converted wrongfully into barbecues, trash-burning barrels, etc., and this could result in injury.

6. Question:
Should a drum be destroyed or cut with a torch?

Answer: NO! Applying a flame or heat to a drum may result in explosive and/or toxic decomposition of residues. Drums should be cut or destroyed by mechanical means only. (See Section VIII, Thermal Decomposition or Burning).

7. Question:
How can a drum reclaimer and reconditioner be located?

Answer: A state-by-state list of drum reconditioners can be obtained from the Reusable Industrial Packaging Association (formerly the Association of Container Reconditioners); phone: 800-533-DRUM (3786); www.reusablepackaging.org. It is important to remember that some isocyanate products, such as Desmodur W, are not hazardous by either listing or characteristic under Resource Conservation and Recovery Act (RCRA) regulations, but are nevertheless still quite hazardous if an unsuspecting employee of a disposal or reclamation facility comes in contact with them. Therefore, it is essential that the reclaimer or disposer be notified of the previous contents of the drums and of the hazards associated with those contents. In addition, state or local regulations and site restrictions may be more stringent than federal RCRA. A regional EPA office or equivalent state agency may be helpful in interpreting local regulations.

8. Question:
How can a copy of the current federal regulations on hazardous wastes be obtained?

Answer:
Contact:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Request:
Title 40 Code of Federal Regulations
Parts 260-299 (RCRA)

9. Question:
How can EPA be contacted to request assistance/advice regarding disposal of hazardous waste?

Answer: Call EPA's RCRA Hotline: 800-424-9346 (9:00 AM to 5:00 PM Eastern time, Monday to Friday).

10. Question:
Where can information be obtained about which companies can do various types of waste treatment or disposal?

Answer:
The Hazardous Waste Services Directory
Published by:
J. J. Keller and Associates, Inc.
3003 West Breezewood Lane
P.O. Box 368
Neenah, WI 54957-0368
Phone: 800-558-5011

Other sources include industrial directories and magazines, state and federal regulatory agencies and industrial trade associations.

Section VIII:
Thermal Decomposition or Burning

1. Question:
What gases can be generated when a substrate that has been coated with a polyurethane coating is cut or welded?

Answer: Gases or vapors evolved can include:

HDI, TDI, MDI, etc., if they were used to make the polyisocyanate resin. For example, *Desmodur* N polyisocyanates can release HDI and *Desmodur* CB polyisocyanates can release TDI. Other isocyanate functional compounds have also been reported, for example, isocyanic acid and methyl isocyanate.

Others:

Carbon monoxide
Carbon dioxide
Hydrogen cyanide
Oxides of nitrogen
Hydrocarbons

When welding or cutting steel coated with a polyurethane system, the worker may be exposed to decomposition products (metal fumes, gases or vapors, particulate) which vary depending on type of process being used to weld or cut, nature of the base metal, and type of coating system. One or more of the following control procedures should be used for welding or cutting steel coated or in contact with a polyurethane system:

- Use a power brush or grinding wheel to strip the coating from the steel in the vicinity where the cut or weld is being made. A well-fitted dust respirator with N95 or better filters and eye protection should be used while stripping the paint.
- Use a local exhaust hood to remove fumes during the welding or cutting operation.
- Use a fresh air supplied respirator during welding or cutting.

Section IX:
Training Resources

1. Question:
What assistance can Bayer offer to customers who wish to train their employees?

Answer:
1. Product Safety Literature including Material Safety Data Sheets.

2. Customer-site Seminar conducted by a Bayer Industrial Hygienist.

3. Videotape for Automotive Refinish Market: **Working Safely with Polyurethane Paints** (English or Spanish language).

4. **2K Polyurethane Auto Clearcoat – A Clear and Safe Success Story.** (Videotape).

5. **Polyurethane Coatings for Wood**: **Performance, Beauty and Compliance**. (Videotape).

6. Consultation by telephone; phone: 412-777-2867.

Notes

Notes

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