Introduction

Welcome to the Shipping with Dry Ice (OHS_BIO200) training course. This course is **required** for anyone mailing shipments refrigerated with solid Carbon Dioxide (Dry Ice).

If you choose to ship a package using Dry Ice, International and Federal requirements dictate that you **must** be trained to do so every two years or when regulations change. Additional training may be required depending on the samples/materials that are being shipped with Dry Ice.

UAB **requires** additional shipping training for anyone that will be packing:

- Materials shipped on Dry Ice: **Shipping with Dry Ice (OHS_BIO200)**
- Infectious substances capable of causing disease in humans or animals: **Shipping Infectious Substances, Category A (OHS_BIO202)**

> Failure to properly pack and ship materials is a **violation** of the law and is punishable with fines and/or imprisonment.

Objectives

At the conclusion, participants should be able to:

1. Identify and use the United Nations (UN) Classification and Proper Shipping Names (PSN) for Dry Ice.
2. Pack any primary, secondary containment, or overpack boxes correctly.
3. Mark and Label any shipping packages correctly.
4. Complete a Shipper’s Declaration if required.
5. Follow all safety guidelines to avoid any accidents or injuries.
Overview

If you need to send shipments that are refrigerated, you may choose to use gel packs or Solid Carbon Dioxide (Dry Ice). Gel packs are not regulated. They are not capable of the cooling to the temperature and duration achieved by Dry Ice. Wet ice, or ice made from water, is not allowed due to the likelihood of leaks.

Dry Ice is a commonly used refrigerant for shipping biological samples and is classified as a Class 9 Miscellaneous Dangerous Good. The United States Department of Transportation (US DOT) and the International Air Transportation Association (IATA) regulate Dry Ice shipments and dictate the specific procedures to follow when shipping with Dry Ice.

Dry Ice refrigerated packages are normally shipped by air. The following course material summarizes the regulatory requirements of Dry Ice-containing shipments by air. The requirements for shipping with Dry Ice as a refrigerant are combined with the shipping requirements that apply to the actual samples/materials you intend to refrigerate. Contact OH&S at 205-934-2487 if you have any questions.
Shipper Responsibilities

Packaging

UN and PSN

Proper identification requires both a UN number and the Proper Shipping Name (PSN). For Dry Ice, the UN Number is UN 1845. The Proper Shipping Name is “Dry Ice” or “Carbon Dioxide, Solid.” Together the proper identification would look like this:

“UN 1845 Dry Ice” or “UN 1845 Carbon Dioxide, Solid.”

Selecting the Proper Packaging

Packaging components for certain hazardous samples must pass testing requirements as a system. Mixing and matching packaging components from different manufacturers is not allowed for Category A or B shipments.

All packaging intended for shipment with Dry Ice must be designed and constructed to allow release of Carbon Dioxide gas, preventing the build-up of pressure. Shippers must make arrangements with the carrier before Dry Ice may be transported.
Outside Packaging

The outside packaging is typically a fiberboard box or container used to hold the gas-permeable insulated cooler, preferably Styrofoam, containing the Dry Ice. Outside packaging also serves as a surface for displaying clear Marks, Labels, and other important information.

Inside Packaging

- Properly **classify** and **identify** the samples or materials you are shipping with the Dry Ice.
- Please refer to the interactive **Classification Flowchart** if you are unsure of the proper classification and to determine if any additional training will be required.
- Once the sample or material is packed with the appropriate packaging material and according to the appropriate packing instructions, you can begin the process of packing it according to Dry Ice regulations (Packing Instructions 954).

All packaging components for Infectious Substances, Category A, or Biological Substances, Category B must be assembled per the manufacturers packing instructions specific to the packaging system purchased. If you will be packing any Category A or B substances, you **must** complete the **required** training.
Sealed Containers

Sealed containers and Dry Ice do not mix. Dry Ice is frozen Carbon Dioxide gas and expands exponentially as it sublimes.

Never place Dry Ice in a sealed container.

Please watch this video to see how dangerous Dry Ice in a sealed container can be. UAB professionals did this experiment. UAB Police were present, and all safety precautions were followed.

Marks and Labels

Dry Ice shipments require the labels described below:

- A Class 9 Miscellaneous hazard black & white diamond-on-point label
- Proper Shipping Name and UN Number (which is either “UN 1845 Dry Ice” or “UN 1845 Carbon Dioxide, Solid”)
- The weight of the Dry Ice (in kilograms) must be included adjacent to the black & white on-point label or the Proper Shipping Name (PSN)
- Any additional substance-specific Marks and Labels required of the material being refrigerated by the Dry Ice

Vendors provide Marks and Labels with the appropriate packaging components. These labels must meet minimal font and dimension requirements.

If you have any questions about the appropriate required Marks and Labels, contact OH&S at (205) 934-2487.
This is an example of a **pre-printed label** available on the [OH&S website](#) that you can complete and affix on the outside of packages that do not contain Category A or B substances. If you are **not** shipping Category A or B substances but are shipping with Dry Ice, you **must** label the **contents being cooled**.

### CONTENTS BEING COOLED:
- Diagnostic or Treatment Purposes
- Exempt Animal Specimen
- Exempt Human Specimen
- Non-Regulated

## Documentation

### Shipper’s Declaration

A Shipper’s Declaration is **required** for UN 1845 Dry Ice **only** when it is used as a refrigerant for Infectious Substances, Category A. If it contains Dry Ice as the packing refrigerant, then the Dry Ice **must** also be listed on the Shipper’s Declaration.

Refer to [49 CFR 173.127](#) to confirm that all requirements have been met.
Waybill

If the items you are shipping do not require a Shipper’s Declaration (non-dangerous goods, “Biological Substance, Category B,” or Exempt Human/Animal Specimens) then the following information must be included on the waybill in the “Nature and Quantity of Goods” section:

- UN Number: UN1845
- Proper Shipping Name: “Carbon Dioxide, Solid” or “Dry Ice”
- The Class or Division Number: 9
- The number of packages
- The Net Weight of the Dry Ice in each package
- “UN3373, Biological Substances, Category B” (if appropriate).

Examples

Appendix A at the end of this document contains pictures showing the correct shipping label requirements for each one below:

- Shipping Nonhazardous or Exempt Specimens
- Shipping Genetically Modified Organisms
- Shipping Biological Substances, Category B
- Shipping Infectious Substances, Category A
Shipping with Dry Ice (OHS_BIO200) Course Material

Security

After preparing the package for shipment, the package must remain under the direct control of trained personnel until it is handed over to the carrier. This reduces the chances of tampering, theft, destruction, or invalidating the shipper’s signature that signifies the package has been prepared in accordance with 49 CFR/IATA regulations.

Things You Need To Remember

There are several things you should remember when shipping items that need to be refrigerated:

- Using “wet ice,” or ice made from water, is **never allowed** due to the likelihood of leaks. You should use Dry Ice or gel packs.
- When using Dry Ice, read and pack according to PI 954.
- Use a Styrofoam box when packing with Dry Ice.
- **Never** place Dry Ice within a sealed container due to the possibility of an explosion.
- If you are shipping a package containing an Infectious Substances, Category A on Dry Ice, the Shipper’s Declarations **must** include the information for Dry Ice as well as the Infectious Substance, Category A.
- If your shipment does not require a Shipper’s Declaration, you must use a waybill.

If you suspect a package has been tampered with notify UAB OH&S immediately at (205) 934-2487.
Exceptions

Overpacks

If multiple fully compliant Dangerous Goods packages are placed within a fiberboard box, it is considered an overpack. All Marks and Labels on the inner packages must be reproduced on the overpack. The word “overpack” must also be placed on the outside of the overpack.

Non-Dangerous Goods

There are exceptions in the regulations for non-dangerous goods shipments by air within the U.S. when using less than 2.5Kg (5.5 pounds) of Dry Ice. The packages must allow for the release of the CO$_2$ gas, be marked “Dry Ice”, list the quantity of Dry Ice and the contents of the package. These packages can be checked on commercial air flights as long as the airline knows ahead of time.

Operator (or Carrier) Responsibilities

- Must detect errors
- Use acceptance checklist
- Ensure safe loading, storage, and transport
- Inspect for damage or leaks
- Report any problems to the proper authorities

Receiver (or Consignee) Responsibilities

The Receiver (or Consignee) is the person(s) the material was sent to at the final destination. Responsibilities are to:

1. Provide assistance with import permits
2. Inspect received packages for damage or leaks. Report any damages to hazardous materials immediately to OH&S at (205) 934-2487.
3. Verify itemized list of contents
4. Report receipt to the shipper
5. Report leaking packages to the appropriate authority
Conclusion

This concludes the Shipping with Dry Ice (OHS_BIO200) training course. This course has the following parts:

1. Shipping Dangerous Goods Module
2. Shipping Dangerous Goods Attestation
3. Shipping with Dry Ice Course Material
4. Shipping with Dry Ice Assessment: 90% or higher is considered passing. You have three chances to successfully complete the assessment. Failing all three attempts means that you fail the course and must retake the course.

Want to Learn More?

OH&S has many training courses available to all UAB active employees and students. This includes topics such as in depth radiation training, biosafety, bloodborne pathogens, chemical safety, Controlled Substances, building life safety, hazardous and medical waste, universal waste, PPE, Hazard Communication, etc.

We have a decision tree to assist you in choosing the right course to match the knowledge/skills you may need at work every day as well.

If you have any questions or comments, please feel free to contact OH&S at (205) 934-2487.
Shipping with Dry Ice (OHS_BIO200) Course Material

Appendix A: Shipping Label Requirements

Shipping Nonhazardous or Exempt Specimens on Dry Ice
Follow IATA Packaging Instruction 954

- Styrofoam cooler (with dry ice)
- Leak-proof primary container
- Leak-proof secondary container
- Absorbent material
- Proper shipping name, UN number, net weight
- Class 9 misc. hazard label

Shipper:
Dr. John Doe
UAB School of Medicine
1801 20th St South
Birmingham, AL 35294
(205) 123-4567

Consignee:
Name
Organization
Street Address
City, State, Zip
(123) 456-7890

Package Contents:
☐ Exempt human specimen(s)
☐ Exempt animal specimen(s)
☐ Other______________

Contents being cooled

DRY ICE UN 1845
___ KG NET WT
Shipping Genetically Modified Organisms on Dry Ice
Follow IATA Packaging Instructions 959 & 954

Styrofoam cooler (with dry ice)
leak-proof primary container
leak-proof secondary container
absorbent material

Shipper:
Dr. John Doe
UAB School of Medicine
1801 20th St. South
Birmingham, AL 35294
(205) 323-4567

Consignee:
Name
Organization
Street Address
City, State, Zip
(123) 456-7890

UN3245
Class 9 misc.
Label
hazard label

UN number required,
proper shipping name
NOT required

Proper shipping name,
UN number, net weight
Shipping with Dry Ice (OHS_BIO200) Course Material

Shipping Biological Substances, Category B, on Dry Ice
Follow Commercial System Instructions; IATA Packaging Instructions 650 & 954

- Leak-proof primary container (test tube)
- Leak-proof secondary container
- Absorbent material
- Itemized list of contents
- Padding maintains orientation of inner packaging

Orientation arrows, if contents exceed 50mL

Class 9 misc. hazard label

Proper shipping name, UN number, net weight

UN3373

Biological substance, Category B

Shipper:
Dr. John Doe
UAB School of Medicine
1801 20th St. South
Birmingham, AL 35294
(205)-123-4567

C onsignee:
Name: Organization
Street Address: City, State, Zip
(123) 456-7890

Responsible Person:
Name: Phone number
Shipping Category A, Infectious Substances on Dry Ice
Follow Commercial System Instructions; IATA Packaging Instructions 620 & 954

Leak-proof primary container (test tube)
Absorbent material
Itemized list of contents
Leak-proof secondary container
Padding maintains orientation of inner packaging

Orientation arrows, if contents exceed 50mL

UN package testing specification mark
Cargo Aircraft Only (for volumes >50 mL)

Shipper: Dr. John Doe
UAB School of Medicine
1801 20th St. South
Birmingham, AL 35294
(205) 123-4567

Consignee: Name
Organization
Street Address
City, State, Zip
(123) 456-7890

Responsible Person: Name
Phone number

INFECTIONOUS SUBSTANCE, AFFECTING HUMANS
UN 2814 Net Qty. 25 mL.
IMMEDIATELY NOTIFY PUBLIC HEALTH AUTHORITY

INFECTIONOUS SUBSTANCE
IN CASE OF DAMAGE OR LEAK
CARGO AIRCRAFT ONLY

Last Updated: 08/18/2017
Appendix B: Shipper’s Declaration Example

**SHIPPER’S DECLARATION FOR DANGEROUS GOODS**

(Provide at least two copies to the airline)

**Consignee**

**Two completed and signed copies of this Declaration must be handed to the operator.**

**WARNING**

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must, in any circumstances, be completed and/or signed by a consolidator, a forwarder, or an IATA cargo agent.

**Shipment type:** (delete non-applicable)

- NON-RADIOACTIVE
- RADIOACTIVE

**NATURE AND QUANTITY OF DANGEROUS GOODS**

<table>
<thead>
<tr>
<th>Dangerous Goods Identification</th>
<th>Class</th>
<th>Division</th>
<th>UN No</th>
<th>ID No.</th>
<th>Packing Group</th>
<th>Subsidiary Risk</th>
<th>Quantity and type of packaging</th>
<th>Packing Inst.</th>
<th>Authorization</th>
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<tbody>
<tr>
<td>Proper Shipping Name</td>
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**Additional Handling Information**

**Emergency Telephone Number**

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable International and National Governmental Regulations.

FOR RADIOACTIVE MATERIAL SHIPMENT ACCEPTABLE FOR PASSENGER AIRCRAFT, THE SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN OR INCIDENT TO RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

**Name/Title of Signatory**

**Place and Date**

**Signature**

(see warning above)