Annex 11. Dry shippers

Dry shippers are large Dewar (vacuum) flasks that are designed for the safe shipment of specimens at liquid nitrogen temperatures without the risk of spilling liquid nitrogen. When prepared correctly a dry shipper does not contain any free liquid nitrogen.

Fig A11.1. A dry shipper and the protective bin in which it is shipped

Fig A11.2 A smaller dry shipper shown

Filling dry shippers

Always follow the manufacturer's instructions for filling. In general:

- Wear a face shield and insulated gloves of the type made for handling liquid nitrogen.
- Always work in well ventilated areas as high concentrations of nitrogen can cause suffocation.
- A significant amount of nitrogen gas will be generated as the cold liquid contacts the warm surfaces inside the shipper. Therefore always add the liquid nitrogen slowly.
- When the liquid reaches the neck of the dry shipper, stop filling. Replace the cap and set the dry shipper aside for the period specified by the manufacturer to allow the liquid nitrogen to saturate the absorbent.
- Repeat steps 1–3 until the liquid level no longer drops on standing. This may require as many as 15 repetitions.

Some manufacturers provide empty and full weights for their dry shippers. If the dry shipper will not reach the expected full weight there may be a problem with the absorbent's ability to hold the nitrogen. This may mean that the low temperature cannot be maintained for as long as is specified in the specifications of the shipper and there is then a risk that the specimens can be damaged. Under these circumstances contact the manufacturer or supplier of the equipment to determine if the dry shipper is safe to use.

Preparing "dry shippers" for transporting specimens

Remove all free liquid nitrogen from the "dry shipper" before transport.

1. Wear insulated gloves, a thermal apron and a face shield when emptying the dry shipper.
2. Empty the dry shipper by pouring the excess liquid nitrogen back into a large liquid nitrogen Dewar flask.
3. If this cannot be done, pour the liquid nitrogen out of the shipper in an appropriate area.
    a. Do **not** pour liquid nitrogen onto the floor since it could splash onto your shoes or legs and cause severe burns.
    b. Ensure that any area where liquid nitrogen is poured away is well ventilated.
4. Hold the dry shipper upside down until the liquid stops flowing.
5. Stand the dry shipper upright for the period specified by the manufacturer.
6. Repeat steps 2–4 as many times as necessary to remove any remaining liquid nitrogen.
7. Put your specimens into the dry shipper and replace the cap.
8. If the dry shipper into the protective case supplied by the manufacturer is designed to be shipped in such a protective device (FigA11.1) – not all of them are (Fig A11.2).