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Abstract

Liquid Nitrogen (LN) is commonly stored in dewars (double lined flasks) separated by a vacuum or other temperature insulation. Dewars come in a variety of sizes depending on the intended use; these go from a fraction of a liter to over 50 l. This section deals with those dewars intended for storage, and some representatives are presented.

Keywords

Dewar • Storing • Dispensing

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At dermatology offices LN is commonly stored in dewars. Dewars are double lined containers with walls separated by an insulator and/or a vacuum space. They are usually constructed of stainless steel, with or without a fiberglass neck and may come with handles to facilitate tilting or displacing and a pouring spout or a lid.

At $-196\text{ }^{\circ}\text{C}$ LN boils and transforms into its gaseous phase expanding rapidly. In a closed environment, this leads to an increase in pressure. Containers must safely accommodate this potentially expanding gas. Since LN explodes if kept in an absolutely closed container, dewars are designed to allow for minimal evaporation.

Dewars can work in two configurations: open, in contact with the atmosphere via a loose-fitting or vented lid to allow for the equilibration of pressure of the gaseous content with its surroundings, or closed, sealed from the atmosphere and incorporating a valve to vent beyond a determined pressure.

Fig. 10.1 Taylor Wharton liquid nitrogen dewars



Dewars are designed to hold differing amounts of LN and to last differing numbers of days respectively. A 10-l capacity dewar should be able to hold enough LN as to last around 50 days, a 30-l dewar the LN should hold enough LN as to last over 120 days. Dewars come in sizes from less than 1 l to 80 l and larger, each having a manufacturer-provided specific static evaporation rate (SER, usually expressed in liters/day), that being the rate at which the LN will evaporate in the container closed, with the efficiency of the dewar being inversely proportional to SER.

Spouts for withdrawal may be fitted over the mouths of dewars, or they may be placed in stands that tilt to facilitate pouring (see below).

Representative dewars are listed and depicted.

The Taylor Wharton dewars LD Series, designed for storing and dispensing small amounts of LN, include a beaker style with a wide mouth (LD5) and pitcher-style for easy pouring (LD4). Features (per the manufacturer) include: High-performance, modern and rugged construction and advanced insulation materials assure high thermal efficiency, superior vacuum performance provide maximum holding times. Ribbed high strength aluminum body, magniformed neck-tube design, durable paint and conveniently located handles allow for easy operation – a snap-on cap and necktube assure tight closure and easy access (Fig. 10.1).

Taylor Wharton Liquid Nitrogen Dewars: The 4 l LD4 weighs empty: 6.6 lbs, full: 13.7 lbs, a height of 17 in. and outside diameter 7.6 in. The 5 l LD5 weighs empty: 6.9 lbs, full: 15.8 lbs, a height of 17.5 in. and outside diameter of 7.6 in. The 10 l LD10 weighs empty: 14.5 lbs, full: 32.3 lbs, a height of 23.5 in. and outside diameter of 11.4 in. The 25 l LD25 weighs empty: 23.2 lbs, full: 67.7 lbs, a height of 25.8 in. and outside diameter of 15.6 in. The 35 l LD35 weighs empty: 35.1 lbs, full: 97.4 lbs, a height of 26.3 in. and outside diameter of 18.8 in. The 50 l LD50 weighs empty: 38.7 lbs full: 127.7 lbs, a height of 32.4 in. and outside diameter of 18.8 in.

The MVE Lab Series, (per the manufacturer) is named for their acceptance in laboratories and medical offices worldwide. These are most convenient and economical. Many can be fitted with pouring spouts, pressurized dispensing devices or dippers. MVE10 unit has a 2.2" throat size. MVE20, 30 and 50 have a 2" throat size. Easy maintenance lid design and a high strength neck tube reduces LN loss. An Advanced Chemical Vacuum Retention System is offered for superior vacuum performance

Fig. 10.2 MVE® dewars

over the life of the product. Superior strength, light-weight aluminum construction (Fig. 10.2).

MVE Lab Series Liquid Nitrogen Dewar:
 4 l MVE4 has a liter static holding time of 2–3 weeks, weighs empty: 6 lbs, full: 13 lbs, a height of 16.8 in. and outside diameter of 7.3 in. The 5 l MVE5 has a static holding time of 4–5 weeks; it weighs empty: 8 lbs, full: 17 lbs, has a height of 18.2 in. and an outside diameter of 8.8 in. The 10 l MVE10 has a static holding time of 6–8 weeks; weighs empty: 13 lbs, full: 30 lbs, has a height of 21.5 in. and an outside diameter of

10.3 in. The 20—l MVE20 has a static holding time of 8–12 weeks; weighs empty: 19 lbs, full: 53 lbs, a height of 24.7 in. and an outside diameter of 14.5 in. Storage Dewars The 20SC Liters – Long Lasting has a static holding time of 200 days, weighs empty: 19 lbs, full: 53 lbs, and has a height of 24.7 in. The 30 l MVE30 has a static holding time of 14–16 weeks, weighs empty: 26 lbs, full: 77 lbs, a height of 24.1 in. and outside diameter of 17 in. The 50 l MVE50 has a static holding time of 14–17 weeks, weighs empty: 34 lbs, full: 123 lbs, a height of 30.7 in. and an outside diameter of 17 in.