

Responsible Ice™/ LifeTime Cooler 28 QT Tests
April 30 – May 5, 2020 Lake Havasu City, Arizona

Summary of TESTS 1 -5

Background

These tests were designed to ascertain if this mid-range, economical LifeTime Cooler and the Responsible Ice™ reusable ice product, the Ri, can replace Dry Ice in certain situations. The need to keep human medical samples in the required temperature range while being stored and transported is of the utmost importance in delivering viable samples to the labs. Dry Ice has been the tool to achieve stabilization of the samples, however dry ice freezes the samples instead of refrigerates them. While this is an accepted method, it is not the best and most recommended by the CDC and FDA. The recommended temperature range is 2° - 8° C (35.6° - 46.4° F) for storage and transport.

Note: some publications indicate an upper range temperature of 10° C (50° F) is acceptable.

Summary of Tests

The Responsible Ice Ri and the LifeTime 28 QT Cooler are both Heavy Duty, easily enough to withstand the commercial use in a mobile laboratory setting. The Ri's were frozen in a regular consumer freezer. Most consumer freezers have the ability to freeze down to 0° F and the Ri has been tested to get as cold as 10° F. For comparison, Dry Ice is -109° F.

The Ri's Solid Mass of Ice immediately starts absorbing the higher temperature of the objects that are placed in the cooler with it. The heat transfer will continue until all objects are the same temperature within the cooler. The rate of transfer of the 'heat to cold' is dictated by the mass of the accepting object, in this case was a small container of milk and a carton of yogurt. These items closely resemble that of human samples. The results showed that the rate of heat transfer was faster with a less viscous material as water. The results did however confirm that both the samples were cooled to and maintained in the required temperature range.

Temperature Environments-

HIGH AMBIENT HEAT The tests determined that in higher ambient temperatures (over 100°), The (1) Ri/Cooler Combination may have a difficult time maintaining a temperature range under 46.4° in some instances. The tests showed that when exposed to an external temperature of over 100° for hours, the sample temperature reached 50° F briefly.

TWO Ri's When two Ri's are used in the same LifeTime 28 QT Cooler, the results are dramatically lower as may be expected. The Cooler/Ri Combination easily achieved and maintained a refrigerated environment for the samples. The usable volume of the cooler is also decreased when two Ri's are used at the same time, but it does leave about 9.3 QT's of area for samples. The rate of heat absorption is also increased as the test results show. The 'combination' dropped the water sample temperature from 81° down to 43.2° in 1 hour and 20 minutes. That same sample was 32.7° after 3 hours with an outside temperature of 101.5°

CONTROLLED ENVIRONMENT

The tests if this series showed that when kept in a temperature controlled atmosphere, the (1) Ri/Cooler Combo is adequate for storing and transporting samples. A controlled environment would be air conditioned buildings and vehicles. This (1) Ri system CAN be exposed to higher temperatures for small time periods. You can also think of it as another heat exchange. When the *outside* of the cooler is exposed to higher ambient heat, the cooler itself starts transferring it's 'cold'. Because the Ri is 'part' of the cooler now, it is also losing it's cooling power when exposed to these atmospheres. Minimizing the time of the exposure will overcome this and increase the efficiency of the system.

If the (2) Ri system is used, the external ambient temperature issue is negated as is shown by the later tests results

CONCLUSION

Responsible Ice™ can replace Dry Ice for storage/transport when used in a mid-quality cooler.

