TrypLE enzymes

Green benefits

- **Sustainable packaging: no dry or gel ice, no expanded polystyrene (EPS) coolers**
- **Energy-efficient: eliminates need for refrigeration, can be stored at ambient temperatures**

Introduction

We are committed to designing our products with the environment in mind—it's part of how we enable our customers to make the world healthier, cleaner, and safer. This fact sheet provides the rationale behind the environmental claims that Gibco™ TrypLE™ Express and TrypLE™ Select cell dissociation enzymes have more sustainable packaging and help save energy compared to porcine trypsin, the most commonly used enzyme for dissociating cells. Because we have eliminated the need for added chemicals to inactivate the enzyme as well as the need for refrigerated shipping and storage, the TrypLE enzymes do not require EPS coolers and refrigerant for shipping—saving energy while delivering exceptional performance.

Product description

The TrypLE products are highly purified, animal origin–free cell dissociation enzymes that replace porcine trypsin and are stable at room temperature. Since the TrypLE enzymes are not derived from an animal source, hazards from potential pathogenic contaminants are eliminated. TrypLE enzymes are so gentle on cells that inactivation with trypsin inhibitors is not required. Additionally, the TrypLE enzymes are ideal for dissociating attachment-dependent mammalian cell lines in both serum-supplemented and serum-free conditions, and can be directly substituted for trypsin without changing the experimental protocol.

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Green features

Sustainable packaging

We have been systematically evaluating novel ways to minimize the environmental impact of shipping our refrigerated products using gel ice and dry ice, as well as the carbon footprint generated by distributing these products. One way we can do this is by shipping the TrypLE enzymes in a recyclable corrugated container instead of an EPS cooler with dry or gel ice (required for trypsin). The adverse environmental impact of shipping frozen products is enormous. The manufacture of EPS coolers, transport of gel and/or dry ice, and disposal of EPS all contribute to CO_2 emissions. Shipping the TrypLE enzymes at ambient temperatures also minimizes these impacts and helps reduce the carbon footprint.

By shipping in standard corrugated containers at ambient temperatures, we have been able to reduce the EPS in our packaging by 3,600 kg per year. By not manufacturing this quantity of EPS and converting it into coolers, we avoid generating 14 tons of CO_2 emissions annually, as well as the use of nearly 40 barrels of crude oil equivalents and 60 megawatt-hours (MWh) of power required to produce that much EPS [1].

Energy-efficient

The TrypLE products are stable under ambient temperature conditions, whereas trypsin activity is lost under these conditions. Trypsin must be repeatedly frozen and thawed, while TrypLE products are ready to use at ambient temperatures.

Working stocks of TrypLE enzymes can be kept at room temperature for 6 months. Stanford University's Sustainability and Energy Management department conducted a pilot study of the university's 350 biological and medical laboratories to investigate the benefit of reducing the need for refrigerated storage of biological materials. They found that transferring their laboratories' eligible biological samples from frozen storage to safe room-temperature storage could potentially cut their electricity use by 40 million kilowatt-hours (kWh), reduce their carbon footprint by 18,000 metric tons, and save $16 million in operating costs while reducing sample risk over the next 10 years [2]. While we recognize that the scale of this study is much larger than the savings you may experience from room-temperature storage of TrypLE enzymes, we have included this example to illustrate the environmental costs of cold storage.

References

1. Data produced using COMPASS™ (Comparative Packaging Assessment) online software tool (v. 1.1) (**designcompass.org/**).
2. **https://sustainable.stanford.edu/sites/default/files/documents/Stanford_Room_Temp_Pilot_May09.pdf**

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