# Lipofectamine 2000, 3000, MessengerMAX, and RNAiMAX Transfection Reagents


## Introduction

We are committed to designing our products with the environment in mind. This fact sheet provides the rationale behind the environmental claim that Invitrogen™ Lipofectamine™ 2000, 3000, MessengerMAX™, and RNAiMAX Transfection Reagents are now responsibly packaged, due to shipping at ambient temperature rather than on gel ice.

In order to minimize the adverse environmental impact of packaging and shipping products on gel ice, we investigated the feasibility of shipping four of our market-leading products—Lipofectamine 2000, 3000, MessengerMAX, and RNAiMAX Transfection Reagents—at ambient rather than cold temperatures. We have found, through functional and analytical testing, that shipping these products at ambient temperature provides the same product quality as shipping the product on gel ice—without impacting long-term stability.

By eliminating the use of gel ice, we are decreasing the volume of packaging and refrigerant, thereby reducing carbon dioxide ($CO_2$) emissions generated from the manufacturing of EPS coolers and refrigerant, increasing freight density, and decreasing fuel consumption due to the added weight of the refrigerant. It also reduces packaging waste in our customers' labs.

## Product description

Lipofectamine 2000, 3000, MessengerMAX, and RNAiMAX reagents are cationic-lipid transfection reagents formulated for superior transfection efficiencies on a variety of cell types. Lipofectamine 2000 and Lipofectamine 3000 reagents deliver DNA or co-transfect with excellent transfection performance for protein expression, gene silencing, and functional assays.

The Lipofectamine RNAiMAX reagent is designed specifically for the delivery of siRNA and miRNA, and Lipofectamine MessengerMAX reagent delivers mRNA with outstanding transfection efficiency in neurons and a broad spectrum of primary cells.


**Figure 1. Lipofectamine™ 2000 and 3000 Transfection Reagent**


**Figure 2. Lipofectamine™ RNAiMAX and MessengerMAX™ Transfection Reagent**

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Green feature

## Responsibly packaged

We have been systematically evaluating novel ways to minimize the impact of shipping products on gel ice, and the carbon footprint generated by the distribution of these products. One way we do this is by challenging the perceived requirement for refrigerated shipping. When our data support a change, we ship the products at a temperature consistent with their demonstrated stability.

Previously, we used more than 5,500 kg of polystyrene to manufacture coolers for Lipofectamine 2000, 3000, MessengerMAX, and RNAiMAX reagents every year. The annual carbon footprint to manufacture that quantity of EPS and convert it into coolers is approximately 16.6 tons of $CO_2$ equivalents per year [1]. By shipping these products at ambient temperatures, we help divert over 18,000 cubic feet of EPS waste from our landfills and incinerators each year, and reduce the total annual carbon footprint from transport and packaging by over 48 tons—roughly the same as taking 10.5 cars off the road every year [2,3].

Functional and stability testing have demonstrated that Lipofectamine 2000, 3000, MessengerMAX, and RNAiMAX reagents, after exposure to simulated ambient temperature shipping conditions, performed identically to and retained the same stability as controls shipped on gel ice [4].


### References

1. Data derived from Bousted, I, Eco-profiles of the European Plastics Industry POLYSTYRENE (Expandable)(EPS). PlasticsEurope, June 2006.
2. Data derived from U.S. EPA, Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance (Optional Emissions From Commuting, Business Travel and Product Transport).
3. U.S. EPA Greenhouse Gas Equivalencies Calculator, epa.gov/cleanenergy/energy-resources/calculator.html, accessed 11 June 2018.
4. For the detailed results of ambient shipping stability and performance testing of Lipofectamine 2000 and RNAiMAX reagents, go to appliedbiosystems.com/cms/groups/services/documents/generaldocuments/cms_103226.pdf


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