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Expi293 PRO Expression System

Introduction

We are committed to designing our products with the environment in mind. This fact sheet outlines how the Gibco™ Expi293™ PRO Expression System achieves up to 81% reduction in material use and up to 75% reduction in energy use compared to the Gibco™ Expi293™ Expression System—and up to 94% reduction compared to conventional polyethyleneimine (PEI)-based transfection methods.

Product description

The Expi293 PRO Expression System is a complete solution for rapid, high-yield protein production from HEK293 cells. It is a fully integrated system consisting of cells, expression medium, and a transfection kit, and is designed to deliver higher yields of a wider variety of proteins—including challenging and low-yield proteins—with exceptional speed, efficiency, and an easy-to-automate protocol. Producing increasingly complex proteins with higher yields and increased throughput is critical to accelerating breakthroughs in protein research applications and drug development. The Expi293 PRO system is designed to help achieve higher titers with less reagents, plasticware, and labor.

Green features

Less waste

The Expi293 PRO system is designed for higher productivity and greater than 4x improvement in yield of proteins across a variety of protein classes, compared to previous systems. These advancements enable up to 81% less material use from reagents and plastic consumables in the protein production process when compared to transfection with the legacy Expi293 system, and up to 94% less compared to PEI (Table 1). Less material use also results in a corresponding reduction in process waste for an equivalent protein output. With far fewer culture volumes required, labs can reduce consumption of raw materials such as media and cell culture additives, along with the single-use plastics and packaging that accompany them (including bottles, caps, filters, bags, and boxes). Fewer inputs mean fewer deliveries to the laboratory and reduced storage needs, less waste to manage, and a smaller environmental footprint—all while maintaining or accelerating production timelines.

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Table 1. Comparison of weekly waste generation for Expi293 PRO and Expi293 systems.

		Expi293 PRO system			Expi293 system		
Procedure step	**Material or waste description**	**Quantity used**	**Unit mass (g)**	**Total mass (g)**	**Quantity used**	**Unit mass (g)**	**Total mass (g)**
Scale-up, cell splitting	2 L flasks	2	202	404	5	202	1,010
	100 mL pipettes	4	29	114	10	29	286
	Media bottles	1	121	121	5	121	605
Day –1 cell split (Expi293 system only)	2 L flasks	–	–	–	8	202	1,620
	100 mL pipettes	–	–	–	16	29	458
Day 0 cell prep	1 L flasks	4	137	548	20	137	2,740
	100 mL pipettes	8	29	229	40	29	1,140
Transfection	Complexation buffer	1	43	43	5	43	214
	Transfection kits	1	96	96	5	96	479
	50 mL conical tube	4	13	50	40	13	500
	Miscellaneous tips	16	75	1,195	80	75	5,976
Feed and enhancer addition	125 mL flasks	1	44	44	5	44	219
	Miscellaneous tips	6	75	448	30	75	2,240
			Total:	**3,290 g**		**Total:**	**17,500 g***
			Waste reduction:	**81%**			

* Waste generation for PEI-based methods is expected to be about 3x higher than for the Expi293 system, making the waste reduction approximately 94%.

More energy efficient

Additionally, the increased protein yield of the Expi293 PRO Expression System results in less energy use, a reduction of up to 75% compared to the legacy Expi293 system, or a 94% reduction compared to transfection with PEI (Table 2). In a standard one-week run with 36 x 1 L flasks per incubator, that translates to an energy reduction of 73 kWh per incubator per batch (2.4 kWh per flask), based on a baseline draw of 582 W over 168 hours (98 kWh). Over routine operation, this totals approximately 3,810 kWh saved per incubator annually, lowering operating costs and environmental impact while helping to accelerate your protein production.

Designing the Expi293 PRO Expression System to use less materials, generate less waste, and be more energy efficient is a win for our customers, our company, and the environment.

Table 2. Summary of weekly energy use and waste generation for Expi293 and Expi293 PRO systems and the PEI-based method.

	Expi293 PRO system	Expi293 system	PEI
Energy per batch*	24 kWh†	98 kWh	391 kWh
Annual energy use	1,270 kWh	5,080 kWh	20,300 kWh
Relative energy use	6%	25%	100%
Waste per batch*	3,290 g‡	17,500 g	52,700 g
Annual waste	171 kg	909 kg	2,740 kg
Relative waste	6%	33%	100%

* Based on one batch of the Expi293 system, 36 flasks per incubator. † Energy reduction is 75% compared to the Expi293 system and 94% compared to the PEI-based method. ‡ Waste reduction is 81% compared to the Expi293 system and 94% compared to the PEI-based method.