Cells-to-C_T kits

Introduction

We are committed to designing products with the environment in mind. This fact sheet provides the rationale behind the environmental claims that use of these products results in reduced exposure to hazardous material and generates less waste than comparable products. Invitrogen™ Cells-to-C_T™ kits require no hazardous solvents, and far fewer plastic consumables from sample preparation to final analysis. In addition, the Invitrogen™ Cells-to-C_T™ Express family of kits promote more efficient energy use by eliminating the need for cold storage of the lysis solution.

Product description

Cells-to-C_T kits include reagents and enzyme mixtures for reverse transcription and real-time PCR performed directly on cultured cells without the need for a separate RNA isolation step. With the Express and HepatoExpress technology, Cells-to-C_T has been made even simpler with only one step for cell lysis, and no need for adding Stop Solution.

Green features

Less hazardous

Traditional RNA extraction protocols require clean-up using hazardous reagents such as:

- **Ethanol**—highly flammable and causes systemic toxicity
- **2-mercaptoethanol**—may be fatal when absorbed through the skin
- **Guanidine thiocyanate**—causes irritation and is harmful if swallowed or inhaled
- **Guanidine hydrochloride**—causes irritation and is harmful if swallowed or inhaled

Cells-to-C_T kits require none of the hazardous chemicals mentioned above.

Please review the MSDS for the Cells-to-C_T kits at thermofisher.com/msds.

Less waste

Traditional methodologies for RNA extraction are laborious and require the consumption of many disposable tubes, vials, columns and pipette tips. Cells-to-C_T kits require fewer plastic consumables than traditional technologies (Figure 1), reducing costs associated with lab plastics and waste disposal. A comparison of Cells-to-C_T kits with traditional technology showed traditional RNA extraction generated ~139.7 g of plastic waste (tubes, pipettes, pipette tips) compared to ~6.7 g with Cells-to-C_T kits (Table 1).

The Cells-to-C_T Express family of kits also decrease waste by not requiring the addition of Stop Solution. This results in a further reduction of plastic tips required for the lysis procedure.

Figure 1. Comparison of plastic waste generated using (A) a Cells-to-CT Express kit vs. (B) a traditional RNA extraction method.

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Table 1. Comparison of the amount of waste generated using a traditional RNA extraction method vs. a Cells-to-C_T Express Kit for 10 reactions.

Traditional RNA extraction method		
Steps in procedure	**Plastics used**	**Total weight (g)**
1. Add 100% ethanol to buffer RPE	One 50 mL tip	20.8
2. Add B-ME to buffer RLT	One 1 mL tip	0.9
3. Tube for hazardous waste	One 50 mL tube	12.6
4. Add 350 µL buffer RLT to samples	Ten 1 mL tips	8.5
5. Add 70% ethanol to samples	Ten 1 mL tips	8.5
6. Add 500 µL buffer RPE to samples	Ten 1 mL tips	8.5
7. Add another 500 µL buffer RPE	Ten 1 mL tips	8.5
8. Tubes for samples	Ten 1.5 mL tubes	10.0
9. Add water to elute	Ten 200 µL tips	2.8
10. Add water to elute again	Ten 200 µL tips	2.8
11. gDNA eliminator columns	Ten columns, tubes	16.5
12. RNeasy™ spin columns	Ten columns, tubes	29.3
13. 2 mL collection tubes	Ten tubes	10.0
Total		**139.7**
Cells-to-C_T Express kit		
Steps in procedure	**Plastics used**	**Total weight (g)**
14. Aliquot lysis mix	One 1.5 mL tube, one 1 mL tip	1.9
15. Add DNase*	One 20 µL tip	0.2
16. Add lysis solution to samples, mix	Ten 200 µL tips	2.8
Total		**4.9**
Waste reduction		**96%**

*Other Cells-to-C_T kits require addition of different reagents. See specific kit user guides for details.

More energy efficient

The Cells-to-C_T Express family of kits include a lysis solution that has been developed for storage at room temperature, freeing up valuable refrigerator space and helping reduce energy consumption. Cold storage is one of the primary sources of energy consumption in the lab. A 2015 study on laboratory energy consumption by the Center for Energy Efficient Laboratories (CEEL) [1] determined that California laboratories alone use at least 800 GWh of energy each year—equivalent to the yearly greenhouse gas emissions from 126,000 passenger cars [2]. According to the CEEL study, approximately 25% of the energy consumption in a typical lab is for cold storage.

Designing Cells-to-C_T products to be less hazardous, produce less waste and be more energy efficient is a win for our customers, our company and the planet.

References

1. Allison Paradise (2015) Market Assessment of Energy Efficiency Opportunities in Laboratories. https://www.etcc-ca.com/sites/default/files/reports/ceel_market_assessment_et14pge7591.pdf
2. US EPA Greenhouse Gas Equivalencies Calculator. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator, accessed May 15, 2023

Find out more at **thermofisher.com/cellstoct**

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