invitrogen™ by life technologies™

ChargeSwitch® Kits

Comparison to traditional purification methods

re:™

Green Benefits

- Less use of hazardous materials
- Less hazardous waste disposal
- Less use of plastic consumables
- Less plastic waste disposal

Introduction

Life Technologies is committed to designing our products with the environment in mind—it's one more step toward a smaller footprint. 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. ChargeSwitch® technology eliminates the need to use hazardous solvents to extract nucleic acids from a wide variety of sample sources, including bacteria, tissues, cells, blood, forensic samples, and buccal cells.

Product Description

ChargeSwitch® technology is used in a variety of formats, from magnetic beads to coated plates to spin columns, and is a simple, clean, and effective means of purifying both DNA and RNA. Unlike other DNA/RNA purification methods, ChargeSwitch® nucleic acid purification technology is 100% waterbased and does not require the use of ethanol, chaotropic salts, organic solvents, or timeconsuming precipitation steps.

Green Features

Less Hazardous

Traditional DNA/RNA purification methods equire cleanup with the use of hazardous reagents such as:

- Ethanol—highly flammable and causes systemic toxicity
- Mercaptoethanol—may be fatal when absorbed through the skin
- Guanidine isothiocyanate—causes irritation and is harmful if swallowed or inhaled
- Guanidine hydrochloride—causes irritation and is harmful if swallowed or inhaled ChargeSwitch® technology eliminates the need to use any of the hazardous solvents mentioned above.

Less Waste

Traditional methodologies for RNA/DNA purification require multiple steps for RNA/DNA extraction and clean-up—requiring the use of multiple disposable tubes, vials, pipettes, and pipette tips. ChargeSwitch® technology requires fewer plastic consumables than traditional technologies. A comparison of the ChargeSwitch® gDNA Tissue Kit with traditional technology showed that 30.03 g of plastic waste (tubes, pipettes, pipette tips) was generated with traditional DNA purification, as compared to 6.24 g (Table 1)—a 79% difference in waste generation. A comparison of the ChargeSwitch®-Pro Plasmid Miniprep Kit with traditional technology showed that 44.33 g of plastic waste (tubes, pipettes, pipette tips) was generated with traditional DNA purification, as compared to 11.04 g (Table 2)—a 75% difference in waste generation.

life technologies™

Table 1. Comparison of the amount of waste generated using traditional gDNA purification methods compared to the ChargeSwitch® gDNA Tissue Kit.

Traditional DNA extraction methods (spin column), quantities per reaction					ChargeSwitch® gDNA Tissue Kit (magnetic beads), quantities per reaction				
Step in procedure	Plastic description	# Used	Piece weight (g)	Total mass (g)	Step in procedure	Plastic description	# Used	Piece weight (g)	Total mass (g)
Add 100% ethanol to wash buffers	10 mL tip	1	20.75	20.75	Add lysis buffer	1 mL	1	0.96	0.96
					Add ProK	0.02 mL tip	1	0.26	0.26
Add RNase	0.2 mL tip	1	0.28	0.28	Add RNase	0.02 mL tip	1	0.26	0.26
Add lysis buffer and incubate	0.2 mL tip	1	0.28	0.28	Add binding buffer	0.2 mL tip	1	0.28	0.28
Add high salt buffer	0.2 mL tip	1	0.28	0.28	Add CST beads	0.2 mL tip	1	0.28	0.28
Transfer to microcentrifuge tube and incubate at 4°C	0.2 mL tip	1	0.28	0.28	Place to magnet				
Transfer to spin column	1 mL tip	1	0.96	0.96	2x wash buffer	1 mL tip	2	0.96	1.92
Centrifuge and place into a clean tube					Elution	0.2 mL tip	1	0.28	0.28
Wash buffer I and place the column into new tube	1 mL tip	1	0.96	0.96	Microcentrifuge tubes	tube	2	1	2
Wash buffer II and centrifuge	1 mL tip	1	0.96	0.96	**Total used**		**10**		**6.24**
Elution	0.2 mL tip	1	0.28	0.28					
Spin column	column & tube	1	1	1					
2 mL collection tube	tube	1	1	1					
Microcentrifuge tube	tube	2	1	2					
Elution tube	tube	1	1	1					
Total used		**14**		**30.03**	**Waste reduction**	**79.2%**			

Table 2. Comparison of the amount of waste generated using traditional DNA purification methods compared to the ChargeSwitch®-Pro Plasmid Miniprep Kit.

Traditional plasmid mini extraction methods, quantities per reaction					ChargeSwitch®-Pro Plasmid Miniprep Kit, quantities per reaction				
Step in procedure	Plastic description	# Used	Piece weight (g)	Total mass (g)	Step in procedure	Plastic description	# Used	Piece weight (g)	Total mass (g)
Add EtOH to PE buffer	50 mL tip	1	20.75	20.75	Add resuspension buffer	1 mL tip	1	0.96	0.96
Tube for hazardous waste	50 mL tube	1	12.54	12.54	Add lysis buffer	1 mL tip	1	0.96	0.96
					Add precipitation buffer	1 mL tip	1	0.96	0.96
Add resuspension buffer	1 mL tip	1	0.96	0.96	Transfer lysate to column	1 mL tip	1	0.96	0.96
Add lysis buffer	1 mL tip	1	0.96	0.96	Centrifuge to lysate clearing & binding for 10 min				
Add precipitation buffer	1 mL tip	1	0.96	0.96	Wash with wash buffer I	1 mL tip	1	0.96	0.96
Clear lysate by centrifuge for 10 min					Wash with wash buffer II	1 mL tip	1	0.96	0.96
Transfer lysate to column	1 mL tip	1	0.96	0.96	Elute with elution buffer	0.2 mL tip	1	0.28	0.28
Centrifuge to binding 1 min					2 mL collection tubes	tube	3	1	3
Wash with PB buffer by centrifuging 1 min	1 mL tip	1	0.96	0.96	Spin column	column	1	1	1
Wash with PE buffer by centrifuging 1 min	1 mL tip	1	0.96	0.96	Microcentrifuge tube	tube	1	1	1
Elute with TE buffer by centrifuging 1 min	0.2 mL tip	1	0.28	0.28	**Total used**		**12**		**11.04**
2 mL collection tubes	tube	3	1	3					
Spin column	column	1	1	1					
Microcentrifuge tube	tube	1	1	1					
Total used		**14**		**44.33**	**Waste reduction**	**75.1%**			

Printed in the USA. **CO21538 0412**

Headquarters
5791 Van Allen Way | Carlsbad, CA 92008 USA | Phone +1.760.603.7200 | Toll Free in the USA 800.955.6288
www.lifetechnologies.com

life technologies™