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Electrocompetent TG1 Cells

Library Grade

Catalog Numbers: EC001-12, EC002-12, EC003-12
Version: A1 – April 2026
Manual & Limited Use License

Product Information

Content:

Each kit includes 12 x 60 µL vials of frozen electrocompetent cells, library grade, a tube of pUC18 control plasmid (10 pg/µL in 25 µL of Tris-EDTA buffer, pH 8.5), and a 25 mL bottle of Resuspension Medium.

PRODUCT SPECIFICATIONS	CATALOG #	TUBE CAP COLOR
Electrocompetent TG1 Library Grade ≥4 x 10^{10} cfu/µg of pUC18 DNA	EC001-12	YELLOW
Electrocompetent SS320 Library Grade ≥4 x 10^{10} cfu/µg of pUC18 DNA	EC002-12	GREEN
Electrocompetent MC1061 Library Grade ≥4 x 10^{10} cfu/µg of pUC18 DNA	EC003-12	PINK

Storage:

The cells are shipped on dry ice. Upon receipt, vials should be transferred immediately to storage at -80°C.

Contact support@abdesignlabs.com if the cells are not frozen upon arrival.

Product Description

Electrocompetent, library grade bacteria are highly competent *E. coli* cells specially prepared for the construction of phage display libraries. Other applications include M13 phage work, screening, cloning and protein expression. Following the described transformation protocol, these cells deliver a guaranteed transformation efficiency of ≥ 4 x 10^{10} cfu/µg using the supplied pUC18 control DNA.

Cells are provided in a convenient 60 µL single-use format to ensure consistent, reproducible results across experiments. These cells are compatible with standard electroporation transformation protocols. The included pUC18 plasmid is provided as a positive control to verify transformation efficiency

Genotype:

TG1:

supE thi-1 Δ(lac-proAB) Δ(mcrB-hsdSM)5, ($r_K^-m_K^-$) F' [traD36 proAB$^+$ lacI^q lacZΔM15]

TG1 is an amber-suppressive, F' pilus-containing *E. coli* strain classically used in phage display.

SS320:

hsdR2 mcrA0 araD139 Δ(araA-leu)7697 ΔlacX74 galK16 galE15(GalS) λe14$^-$ rpsL150(Str^R) spoT1 thi F'[proAB+lacIqlacZΔM15 Tn10 (tet^r)]

A non-amber suppressor, F' pilus-containing strain used for large-scale amplification of M13 phage libraries and phage display protein expression.

MC1061:

F$^-$ Δ(ara-leu)7697 [araD139]$_{B/r}$ Δ(codB-lacI)3 galK16 galE15 λ$^-$ e14$^-$ mcrA0 relA1 rpsL150(strR) spoT1 mcrB1 hsdR2(r$^-$m$^+$)

A high efficiency cloning strain lacking the *lac* operon utilized for high-competency transformations and DNA library construction.

Required Reagents Not Supplied

- Antibiotic-Supplemented Agar Plates

Protocols

The following protocol is suitable for the construction of libraries of up to 10 billion transformants in size. For smaller libraries, lower the DNA concentration and the number of electroporations accordingly.

DNA Preparation

Salts must be removed as thoroughly as possible to achieve the lowest ionic strength possible and prevent arcing during the electrical pulse. DNA concentration should ideally be between 50 and 100 ng/µL for large libraries. These concentrations can be achieved using commercial DNA purification kits with small spin columns compatible with pure water elution. Left over DNA ligase must be inactivated by heat prior to the purification.

Transformation

Transformations are carried out in electroporation cuvettes with a gap of 0.1 or 0.2 cm. Gap of 0.2 cm are recommended for the construction of large libraries. Electroporations are carried out at a voltage of 1.8 kV (18 kV/cm) in 0.1 cm cuvettes and at a voltage of 2.5 kV (12.5 kV/cm) in 0.2 cm cuvettes. The volume of cells is 25 to 30 µL for 0.1 cm cuvettes and 50 to 60 µl for 0.2 cm cuvettes. The cells should be thawed on ice and the cuvettes precooled on ice prior to the electroporation. All reagents and equipment that come in contact with the cells should be sterile. Handle gently as electrocompetent cells are highly sensitive to changes in temperature and mechanical lysis. Vigorous shaking or pipetting when working with the cells should be avoided to maintain cell health.

Protocol

1. Have 15 mL Falcon tubes ready at room temperature (one tube per reaction) as well as pre-warm Resuspension Medium and selective agar plates at 37°C.

   Note: For the control pUC18 transformation, use agar plates supplemented with 100 µg/mL ampicillin or carbenicillin.

2. Remove a vial of electrocompetent cells from storage at - 80°C and immediately place on wet ice till fully thawed. Ensure cells remain on ice at all times.

   Note: Leaving the cells too long on ice will result in lower transformation efficiency.

3. Gently pipette between 1 and 5 µL of DNA into the thawed competent cells. For the control pUC18 use 1 µL. Stir gently with pipette tip. Avoid pipetting up and down to mix as this will introduce bubbles.

4. Carefully transfer the cells into a pre-chilled 0.2 cm gap cuvette. Avoid introducing air bubbles as these will cause electrical arcing during electroporation. Quickly flick cuvette downwards with your wrist to distribute cells evenly.

5. Electroporate with a single pulse. Typical time constants are between 4.5 - 5.5 ms. As soon as possible, add 975 µL of pre-warmed Resuspension Medium to the cuvette, pipette up and down to resuspend cells and then transfer to a culture tube. Repeat with another 975 µL to rinse the cuvette.

6. Incubate the tubes in a shaking incubator for 1 h at 37°C and 250 rpm.

7. Spread 100 µL of transformed cells and 10-fold dilutions on pre-warmed selective antibiotic-containing agar plates.

8. Incubate plates inverted at 37°C overnight.

Calculating Transformation Efficiency

Use the following formula to calculate transformation efficiency as transformants (cfu) per µg of plasmid DNA:

$$\frac{\text{cfu}}{\mu\text{g}} = \frac{\text{cfu count}}{\text{pg DNA}} \times \frac{10^6\ \text{pg}}{\mu\text{g}} \times \frac{\mu\text{L transformation}}{\mu\text{L plated}} \times \text{dilution factor}$$

For example, if transformation with 50 pg of pUC18 yields 50 colonies when 10 µL of a 1 mL total transformation is plated, then:

$$\frac{50\ \text{cfu}}{50\ \text{pg DNA}} \times \frac{10^6\ \text{pg}}{\mu\text{g}} \times \frac{1000\ \mu\text{L}}{10\ \mu\text{L}} = 1\times10^8\ \frac{\text{cfu}}{\mu\text{g pUC18}}$$

Media Recipes

LB Agar (per Liter):

10 g NaCl
10 g Tryptone
5 g Yeast extract
20 g of agar
Add ddH_2O to a final volume of 1 L
Adjust pH to 7.0 with 5 N NaOH
Sterilize by autoclaving

LB-Ampicillin Agar (per Liter):

1 L autoclaved LB agar
Cool to 55°C
Add 10 ml of 10 mg/ml filter-sterilized ampicillin
Pour into petri dishes (approx. 25 ml per 10-cm plate)

Limited Product Warranty

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