

AGL-1 *Agrobacterium* Chemically Competent Cells Transformation Protocol

Introduction

GoldBio's AGL-1 *Agrobacterium* chemically competent cells allow you to obtain high transformation efficiency in applications such as gDNA or cDNA library construction. Our AGL-1 strain harbors the C58 chromosomal backbone with an insertion mutation in its *recA* recombination gene. This mutation stabilizes recombinant plasmids.

AGL-1 also has rifampicin and carbenicillin resistance genes in the genome useful for selection. A functional T-DNA binary system can be built using our AGL-1 strains as the T-DNA region has been deleted from the Ti plasmid pTiBO542 and instead it has a binary vector containing the missing T-region. The binary system makes possible to transfer genetic material into a host plant S genome. Therefore, our system is often used for *Agrobacterium*-mediated transformation in mono and dicotyledonous species such as *Arabidopsis thaliana*, maize, and other plants.

Here, we present a detailed protocol for transformation using AGL-1 *Agrobacterium* Chemically Competent Cells using either liquid nitrogen or a dry ice/ethanol bath.

Materials

- AGL-1 *Agrobacterium* Chemically Competent Cells (GoldBio Catalog # CC-106)
- pCAMBIA1391z Control DNA, 10 ng/μl
- *Agrobacterium* Recovery Medium
- Kanamycin (GoldBio Catalog # K-120)
- Rifampicin (GoldBio Catalog # R-120)
- Yeast Extract Tryptone (YT) or LB Agar selection plates.
- Microcentrifuge tubes
- Shaker incubator

Storage and Handling

- This product may be shipped on dry ice. AGL-1 *Agrobacterium* Chemically Competent Cells should be stored at -80°C, pCAMBIA1391z Control DNA, 10 ng/μl, should be stored at -20°C and recovery medium should be stored at 4°C immediately upon arrival. When stored under the recommended conditions and handled correctly, these products should be stable for at least 1 year from the date of receipt.

- Thaw AGL-1 *Agrobacterium* Chemically Competent Cells and pCAMBIA1391z Control DNA on ice and mix by gently tapping the tube. After thawing, these products should be kept on ice before use.
Note: Transformation efficiency is tested by using the pCAMBIA1391z control DNA supplied with the kit and using the protocol given below. Transformation efficiency should be between 3×10^4 to 1×10^5 cfu/ μ g pCAMBIA1391z DNA. Untransformed cells are tested for appropriate antibiotic sensitivity.

Method

Transformation protocol

Use this procedure to transform AGL-1 *Agrobacterium* Chemically Competent Cells. Do not use these cells for electroporation.

Note: Handle the competent cells gently as they are highly sensitive to changes in temperature or mechanical lysis caused by pipetting.

Note: Thaw competent cells on ice and transform cells immediately following thawing. After adding DNA, mix by tapping the tube gently. Do not mix cells by pipetting or vortexing.

1. Place microcentrifuge tubes on ice.
2. Remove competent cells from the -80°C freezer and thaw completely on ice (10-15 minutes).
3. Aliquot $1 \mu\text{l}$ (50 ng to 500 ng) of DNA to the chilled microcentrifuge tubes on ice.

Note: It is important to use more DNA than in a typical bacterial transformation. We recommend using ~ 500 ng, if possible.

4. When the cells are thawed, add $50 \mu\text{l}$ of cells to each DNA tube on ice and mix gently by tapping 4-5 times. For the pCAMBIA1391z control, add $5 \mu\text{l}$ of ($10 \text{ ng}/\mu\text{l}$) DNA to $50 \mu\text{l}$ of cells on ice. Mix well by tapping. **Do not** pipette up and down or vortex to mix, this can harm cells and decrease transformation efficiency.
5. Keep tubes on ice for 5 minutes, and then transfer to a dry ice/ethanol bath or liquid nitrogen for 5 minutes.

Note that if you used a dry ice/ethanol bath you can place the frozen tubes on dry ice for up to 30 minutes prior to the 37°C heat shock.

Note: For a dry ice/ethanol bath, we recommend adding ~ 200 ml EtOH to a used pipet tip container and slowing adding dry ice over the course of 10 minutes.

6. Incubate tubes in a 37°C water bath for 2 minutes (for dry ice/ethanol bath) or for 5 minutes (for liquid nitrogen).
7. Immediately add 950 µl of Recovery Media and gently pipette up and down three times to resuspend the cells.
8. Incubate at 30°C for 3 hours at 200 rpm in a shaking incubator.
9. Dilute the cells as appropriate, then spread 2 to 200 µl cells onto a selective plate. For the pCAMBIA1391z control, plate 200 µl of the diluted transformants onto a YT or LB plate containing 5 µg/ml rifampicin to select for the *Agrobacterium* as well as and 50 µg/ml kanamycin to select for the pCAMBIA control. Use a sterilized spreader or autoclaved plating beads to spread evenly.

Note: Dry plates for at least 25 minutes in a biohood for best results.

Note: For best results, we recommend spreading 2 µl, 20 µl and 200 µl onto separate plates for each transformation. For the 2 or 20 µl plates, add 200 µl of recovery media to help spread. This helps to save time if transformation efficiencies are either very low or very high.

10. Incubate the plates for 2-3 days at 30°C.

Table 1. Antibiotic Disc Sensitivity for GoldBio's *Agrobacterium* Strains (using standard BD antibiotic discs)

Competent cells	Antibiotic Selection									
	Amp 100 µg/ml	Carb 100 µg/ml	Chlor 30 µg/ml	Chlor 100 µg/ml	Gent 30 µg/ml	Kan 50 µg/ml	Rif 25 µg/ml	Spec 50 µg/ml	Strep 50 µg/ml	Tet 50 µg/ml
GV3101	I	R	R	PR	R	S	R	S	R	S
EHA 105	R	R/S	R	N/A	R/S	S	R	S	R	S
LBA 4404	S	S	S	N/A	S	S	R	S	R	S
AGL-1	R	R	R	N/A	R/S	S	R	S	R	S
C58C1	R	R	R	N/A	R/S	S	R	S	R	S

S = Sensitive

R = Resistant

R/S= intermediate zones using standard discs.

I= growth in inhibitory zone with standard disc. "Opaque", not clear zone of inhibition.

Calculations

Transformation efficiency (TE) is defined as the number of colony forming units (cfu) produced by transforming 1 μg of plasmid into a given volume of competent cells.

$$\text{TE} = \text{Colonies}/\mu\text{g}/\text{Dilution}$$

Where:

Colonies = the number of colonies counted

μg = amount of DNA transformed in μg

Dilution = total dilution of the DNA before plating

Example:

Transform 5 μl of (10 ng/ μl) pCAMBIA1391z control plasmid into 25 μl of cells, add 975 μl of Recovery Medium. Recover for 3 hours and plate 100 μl . Count the colonies on the plate in two days. If you count 500 colonies, the TE is calculated as follows:

$$\text{Colonies} = 500$$

$$\mu\text{g of DNA} = 0.05$$

$$\text{Dilution} = 100/1000 = 0.1$$

$$\text{TE} = 500/0.05/0.1 = 1 \times 10^5$$

Related Products

- AGL-1 *Agrobacterium* Chemically Competent Cells (GoldBio Catalog # CC-106)
- GV3101 *Agrobacterium* Chemically Competent Cells (GoldBio Catalog # CC-105)
- LBA4404 *Agrobacterium* Chemically Competent Cells (GoldBio Catalog # CC-107)
- EHA 105 *Agrobacterium* Chemically Competent Cells (GoldBio Catalog # CC-108)
- C58C1 *Agrobacterium* Chemically Competent Cells (GoldBio Catalog # CC-109)
- Carbenicillin (GoldBio Catalog # C-103)
- Kanamycin (GoldBio Catalog # K-120)
- Rifampicin (GoldBio Catalog # R-120)