

ProGro™ Medium

Cat No: 40111, 40112, 40113, 40114

Contents: sterilized 1X liquid medium, Adds I and Adds II

Storage: room temperature

Description

ProGro™ Medium is designed for high yield protein expression in E.coli cells. The medium contains trace metals, minerals, and vitamins which may serve as ligands, co-factors or prosthetic groups for proteins. The E.coli cells can grow to a density up to 30 (OD_{600}) which is significantly higher than the density that can be obtained by a regular medium such as LB. Five to 20 times recombinant protein may be produced compared with a regular medium.

The protein can be induced at early log phase which is $OD_{600}=2$ to 5 for this medium. It can also be induced at $OD_{600}=5$ to 10.

Higher concentration of antibiotic is needed for higher cell density. We normally use 200 ug/ml ampicillin for selection and same concentration of ampicillin is added at induction.

Aeration

Good aeration is critical for high cell density and auto induction. Please check the aeration of the incubation room, incubator, and the container.

After cells reach $OD_{600}=10$, they will need sufficient amount of oxygen to reach higher density. Low shaking speed cannot support cell growth over $OD_{600}=20$. Higher shaking speed than those specified in the table will result in medium spilled out. Please note maximum shaking speed is different for each type of container with defined volume of medium.

At recommended shaking speed, all clamps and containers should be secured on the platform. Balanced loading will increase incubator life especially for large volume. Incubation room needs to be sufficiently ventilated. Ventilation fans of many incubators may require temperature setting. Therefore room temperature incubation will still need to set temperature at 25 °C to keep the fan on. Container cover cannot be closed. Use the cover allowing best ventilation possible. After $OD_{600}=10$, the container cover should be removed to maximize aeration. We never encounter any cross-contamination at this or higher cell density.

Protocol

1. Add 0.1% v/v Adds I, Adds II and appropriate amount of antibiotic just before use. Shake the medium well before using or aliquoting*. Inoculate at 1:100 for most E.coli strains. The medium volume should be 1/4 of a flask or 1/10 of a tube volume or less. For example, 500 ml or less should be used in a 2-liter flask.

2. Grow the cells to appropriate density in a 2 to 3 liter flask at **300-450 rpm** shaking at 37 °C. The higher shaking speed, the higher cell density can be obtained. The cells need to be diluted to $OD_{600} \leq 0.3$ to get accurate reading (about 100x dilution).

Flask	Regular	Baffled	Tube
RPM	Up to 450	Up to 400	Up to 400

3. Add appropriate amount of IPTG or other inducer at $OD_{600}=2$ to 5. Induce the cells at different temperature for different time period.

* Antifoaming agents do not dissolve in the medium. Shake well if foams are not desired. This is important for baffled flasks. Under most conditions, there is no foam in tube cultures and there are less foams in regular flasks.

Toxicity

If some cells can reach high density ($>OD_{600}=20$) while others cannot under the same condition. The proteins encoded by the plasmids in the low density cells may be toxic to the host. Our detoxification medium and cell strains may be needed to express these proteins. Combining our detoxification cell strain with our medium will increase cell density and protein expression significantly.

Regular verses Baffled Flasks

Baffled flasks generate better aeration at larger volume with low shaking speed. Larger medium volume can be used at low shaking speed in baffled flasks. However medium may be spilled out in some baffled flasks at 350 RPM or higher speed. Lower volume or lower shaking speed should be used for these flasks.

Induction Temperature

Cells can be induced at temperatures between 10 to 37 °C. The lower the temperature is, the longer growth time will be needed. 24 to 48 hours may be needed for cells grown at 15 °C. Overnight growth (>14 hours) should be performed at 25 °C. Lower temperature may increase protein solubility.