

Pelleting Bacteria Using Thermo Scientific Fiberlite Large Volume Rotors

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KEY WORDS

- Bacterial Pelleting
- Carbon Fiber Rotors
- Superspeed Centrifuges

Introduction

Bacterial cells grown in tissue culture media for extracting nucleic acids are frequently harvested with conventional superspeed centrifuges using metal, fixed-angle rotors, which carry bottles with volumes up to 500 mL.^{1,2} These rotors weigh approximately 40 to 49 lbs. (19 to 22 kg). The total run time to pellet the bacteria and solids in these heavy metal rotors can be up to 20 minutes per run.

Thermo Scientific Fiberlite large volume carbon fiber rotors accept bottles up to 1000 mL in volume to sediment solids such as bacteria, yeast and other protein precipitates from fermenters or bioreactors. These rotors are lighter weight and range from 20 to 35 lbs. (10 to 15 kg).

Due to the reduced weight of the Fiberlite™ large-volume carbon fiber rotors, superspeed centrifuges like the Thermo Scientific Sorvall Evolution RC, and Sorvall® RC-6 Plus and competitor high speed centrifuges can sediment large volumes of solids in a set run time of 8 to 10 minutes. When considering the time required for acceleration and deceleration, the lighter weight rotors allow for the larger volume samples to experience the maximum force for a longer period of time resulting in a more efficient separation in less time.

This technical note describes sedimentation protocols for bacterial cells in large-volume carbon fiber rotors (F8-6x1000y, F9-4x1000y, and F10-6x500y) and compares the run times to equivalent metal rotors.

Procedures

Inoculate Luria-Bertani broth (LB) with *Escherichia coli* (*E. coli*) containing the plasmid pBR322 and incubate overnight at 37°C with vigorous shaking.^{3,4}



The Fiberlite F9-4x1000y mL
Fixed-Angle Carbon Fiber Rotor



The Fiberlite F10-6x500y mL
Fixed-Angle Carbon Fiber Rotor



The Fiberlite F8-6x1000y mL
Fixed-Angle Carbon Fiber Rotor

Polycarbonate or polypropylene bottles can be used in all 3 rotors. Fill the bottles with the bacteria-containing medium and place in the appropriate rotor.

Place the carbon fiber rotor in the

superspeed centrifuge and spin under the conditions shown in Table 1. In all studies, the pellets to be obtained will be compact and easy to remove after the supernatant is decanted from the bottles.

| Manufacturer | Rotors | Max. Speed (RPM) | Max. G-force (x g) | Volume (mL) | Empty Weight (kg) | Set Run Time (min) |
|-------------------|-------------|------------------|--------------------|-------------|-------------------|--------------------|
| Fiberlite | F10-6x500y | 10,000 | 17,700 | 3,000 | 12.6 | 8 |
| Fiberlite | F9-4x1000y | 9,000 | 15,200 | 4,000 | 14 | 10 |
| Fiberlite | F8-6x1000y* | 8,500 | 15,800 | 6,000 | 15 | 10 |
| Thermo Scientific | GS-3 | 9,000 | 13,700 | 3,000 | 22 | 20 |
| Thermo Scientific | SLA-3000 | 12,000 | 24,000 | 3,000 | 14.4 | 20 |
| Competitor B | X | 10,000 | 17,700 | 3,000 | 18 | 20 |
| Competitor B | Y | 10,000 | 18,500 | 3,000 | 12 | 15 |

Table 1. Rotors, set run times and total run times at maximum speeds for *E. coli* pelleting.

*Rotor exclusively available for the Sorvall Evolution RC centrifuge.

Conclusion

The suggested set run times for the conventional superspeed centrifuges is 8 minutes with the Fiberlite F10-6x500y mL rotor and 10 minutes with the Fiberlite F9-4x1000y mL rotor or F8-6x1000y rotor. However, the run times can be up to 20 minutes when the Thermo Scientific Sorvall GS-3 and SLA-3000 metal rotors and 2 competitor metal rotors are used.

The table above suggests a substantial increase in throughput efficiency when using carbon fiber rotors. Not only is the pelleting processed decreased in time, but larger volumes of sample can be processed per run. This is made possible by combining standard centrifuges with the lightweight Fiberlite carbon fiber rotors. In addition, the lighter weight Fiberlite rotors make it easier to remove rotors from the centrifuge for storage or cleaning when these rotors are used in a multi-use or academic laboratory. The lighter weight of carbon fiber rotors may also reduce the amount of inertia the centrifuge motor must overcome to turn a Fiberlite rotor. The lower stress on the motor relates to less wear and tear on critical drive components such as mounts, bearings, shafts, and seals allowing for a reduction in centrifuge maintenance costs.

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