

The Lipemic Serum Clarification System

Using the Beckman Coulter Airfuge Ultracentrifuge.

The Lipemic Serum Clarification System clears blood samples of lipemia caused by chylomicrons—fat particles 80–500 nm in diameter that impair accuracy of spectrophotometric analyses. These are especially apparent in serum after subjects consume a meal rich in fats, but also appear in 1% to 3% of sera collected from subjects who have fasted.

With samples in which these lipids are present, it is virtually impossible to obtain accurate spectrophotometric test results. The particles strongly scatter light, increasing absorbance readings and causing values to be considerably overestimated. Fat particles also displace aqueous volume and increase serum viscosity, causing concentrations to be slightly underestimated.

Conventional centrifugation, filtration, and extraction techniques are often used in attempts to diminish these errors. But these solutions take too much time, require too much sample, or introduce adsorption and denaturation problems.

The Lipemic Serum Clarification System from Beckman Coulter provides a better way. It is remarkably fast—a 10-minute spin does the job. And remarkably simple—involving a tabletop Airfuge ultracentrifuge and a special rotor with disposable liners.

System Components

The polyethylene liner is made up of two concentric chambers—a doughnut-shaped outer chamber, and an inner chamber shaped like an inkwell, with a hole at the top for pipetting sample in and out of the liner. Two polyethylene liners are available: the 3.5 mL liner which yields 2.6 mL of clarified serum and the 2.4 mL liner which yields 1.5 mL of clarified serum.

The rotor features an anodized base machined to fully support both chambers of the plastic liner. It has a stainless steel cover with an opening on the top, through which protrudes the dome of the inner chamber with the sample access hole. The cover is screwed down on the rotor base, compressing the liner and sealing the outer chamber from the inner chamber.



Airfuge
CLS Ultracentrifuge



Chylomicron Rotor
with polyethylene liner and rotor stand

How the System Works

During centrifugation, the inner chamber is forced downward, permitting flow between the two chambers. The low-density fat particles float to the center of the rotor; the area of lowest centrifugal force. As the rotor decelerates, the outer chamber is again sealed off by compression, isolating the fatty concentrate in the inner chamber. The fatty liquid portion is removed from the inner chamber with the rotor cover screwed down. The cover is removed so that the clarified serum can be collected from the outer chamber.

In addition to clarifying lipemic serum, this system can be used to remove fatty particles from other body fluids and tissue homogenates. It also works well for other applications where the material of concern can be isolated by flotation when centrifuged.

Procedure

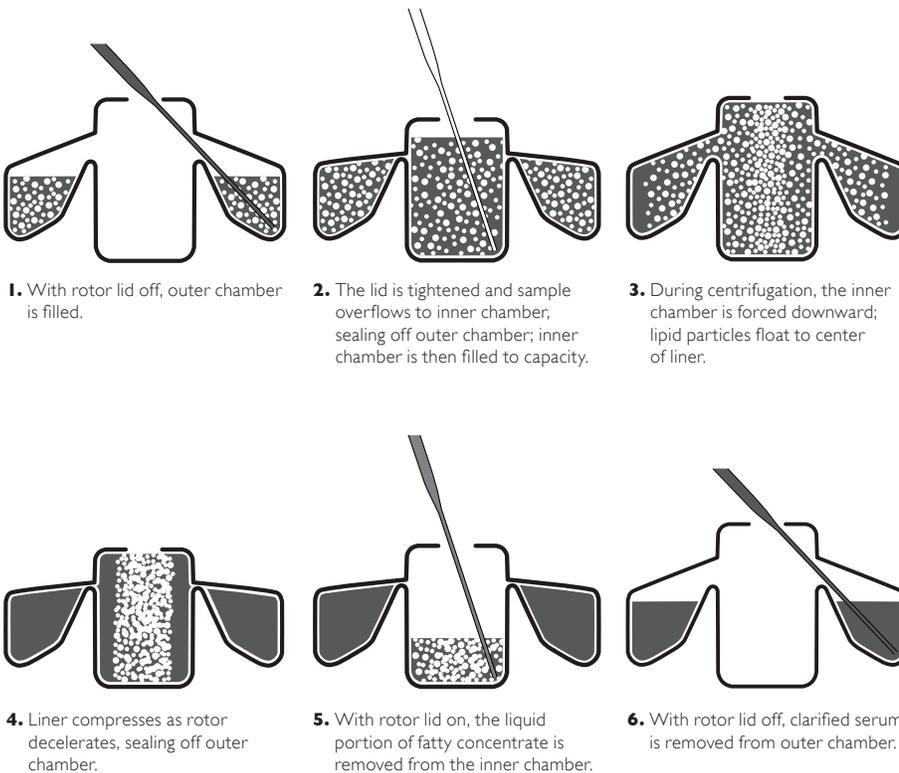


Figure 1. The ability of the Airfuge ultracentrifuge to spin small samples at high g-forces makes it ideal for clarifying lipemic samples. Powered by ordinary laboratory air pressure, the ultracentrifuge accelerates to speed in just 60 seconds. Tiny air jets levitate and accelerate the rotor. Turbine flutes machined on the bottom of the rotor provide the driving surface for the air jets.



Figure 2. The rotor stand, molded to the shape of the rotor, supports the rotor while it is being loaded and unloaded, and immobilizes the rotor base while the rotor is being screwed on or off.



Figure 3. The base of the rotor is designed to completely support both chambers of the liner during centrifugation.

CHYLOMICRON ROTOR SPECIFICATIONS

Liner	Max. Speed	Max. Force		Liner Volume		Approx. Accel. Time	Approx. Decel. Time	Required Airflow Rate
2.4mL	90,000 rpm ± 4,000	<i>r</i> _{min}	27,000 x <i>g</i>	Total	2.4 mL	1 minute	2.5 to 5 minutes	3.5 cubic ft. per minute (0.0016 m ³ /s) at 42 psi (290 kPa)
		<i>r</i> _{av}	67,000 x <i>g</i>	Inner Chamber	0.9 mL			
		<i>r</i> _{max}	107,000 x <i>g</i>	Outer Chamber	1.5 mL			
3.5 mL	90,000 rpm ± 4,000	<i>r</i> _{min}	27,000 x <i>g</i>	Total	3.5 mL	1 minute	2.5 to 5 minutes	3.5 cubic ft. per minute (0.0016 m ³ /s) at 42 psi (290 kPa)
		<i>r</i> _{av}	75,000 x <i>g</i>	Inner Chamber	0.9 mL			
		<i>r</i> _{max}	122,000 x <i>g</i>	Outer Chamber	2.6 mL			

Ordering Information

341260 Chylomicron Rotor Package, includes 341259 ACR-90 Chylomicron Rotor, 341252 Rotor Stand, and 341251 3.5 mL Polyethylene Liners (pkg. of 100).

Supplies and Replacement Parts

342634 Polyethylene Liners, 2.4 mL (pkg. of 100)

341251 Polyethylene Liners, 3.5 mL (pkg. of 100)

342635 Adapter for 2.4 mL Liner



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