



## Environmental Analysis Program

Pomona College  
Biogeochemistry Laboratory

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SOP-L109

# Thermo Scientific Sorvall ST8R Centrifuge

Standard Operating Procedure

|                     |                            |
|---------------------|----------------------------|
| <b>SOP Number</b>   | SOP-L109                   |
| <b>Revision</b>     | 0.2                        |
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## 1. Purpose

This procedure describes the safe setup, operation, and maintenance of the Thermo Scientific Sorvall ST8R centrifuge. The centrifuge is used to separate substance mixtures of different densities and is integral to sample preparation workflows across multiple laboratory SOPs (Thermo Fisher Scientific, 2016).

## 2. Scope

- **Applies to:** Thermo Scientific Sorvall ST8/8R centrifuge in the EA Program laboratory
- **Does not apply to:** Clinical centrifuges (see *SOP-L108*), microcentrifuges (see *SOP-L26*), or field-portable centrifuges
- **Location:** EA Program laboratory, Pomona College

## 3. Definitions

- **Balancing:** The process of pairing tubes of equal mass (within 0.1 g) in opposite rotor positions; required to prevent rotor imbalance, vibration, and bearing damage; failure to balance is the leading cause of centrifuge damage and injury (Thermo Fisher Scientific, 2016).
- **Fixed-angle rotor:** A rotor that holds tubes at a fixed angle (typically 20–45° from vertical); particles pellet against the side and bottom of the tube.
- **g-force (relative centrifugal force, RCF):** The centrifugal acceleration expressed as a multiple of gravitational acceleration ( $9.81 \text{ m s}^{-2}$ ); calculated as  $\text{RCF} = 1.118 \times 10^{-5} \times r \times N^2$  where  $r$  is the rotor radius in cm and  $N$  is speed in rpm (Thermo Fisher Scientific, 2016).
- **Pellet:** The solid material sedimented to the bottom (or side-bottom) of a centrifuge tube after centrifugation.
- **Supernatant:** The liquid layer remaining above the pellet after centrifugation; the fraction of interest in many extraction procedures.
- **Swinging-bucket rotor:** A rotor whose buckets pivot to a horizontal position during spinning; particles pellet at the base of the tube, producing a well-defined pellet and cleaner supernatant.

## 4. Responsibilities

| Role              | Responsibility                               |
|-------------------|----------------------------------------------|
| Lab PI            | Approve SOP, ensure training compliance      |
| Lab Manager       | Schedule maintenance, verify rotor condition |
| Trained Personnel | Follow this SOP, report deviations           |
| New Students      | Complete training before independent use     |

## 5. Safety and Hazards

### Hazards

- **Physical:** Rotating rotor stores significant kinetic energy; rotor or bucket failure can eject debris. Maintain a 30 cm clear zone around the centrifuge during operation. Never open the door until the rotor has completely stopped and the display confirms it (Thermo Fisher Scientific, 2016).
- **Chemical:** Corrosive samples can damage rotors and accessories if not cleaned promptly

after use.

- **Biological:** Pathogenic or biohazardous samples require sealed tubes or biosafety rotor lids. The centrifuge is not aerosol-tight in the event of mechanical failure (World Health Organization, 2020).

### 5.1. Required PPE

- ☐ Safety glasses
- ☐ Lab coat
- ☐ Nitrile gloves (when handling samples)

### 5.2. Emergency Procedures

In the event of a hazardous spill or rotor failure:

1. Turn off the power supply immediately; pull the power plug if necessary.
2. Leave the area and do not attempt to open the centrifuge.
3. Contact the lab manager and refer to [SOP-L003 Hazardous Materials Handling](#).
4. The emergency door release may be used only to recover samples during a power failure, not during mechanical failure (Thermo Fisher Scientific, 2016).

## 6. Equipment and Materials

| Item                                        | Notes                                |
|---------------------------------------------|--------------------------------------|
| Thermo Scientific Sorvall ST8/8R centrifuge | (Thermo Fisher Scientific, 2016)     |
| Power supply cable                          | Grounded outlet required             |
| Rotors and buckets                          | Must be approved for this centrifuge |
| Instruction manual                          | Keep accessible near the instrument  |
| Balance tubes                               | For balancing samples before runs    |

## 7. Procedure

### 7.1. Site Selection and Setup

1. Operate the centrifuge indoors only.
2. Place on a horizontally leveled, rigid surface with adequate load-bearing capacity.
3. Maintain a safety zone of at least 30 cm around the centrifuge; do not place any hazardous substances within this zone (Thermo Fisher Scientific, 2016).
4. Ensure the setup location is well-ventilated and not exposed to heat or direct sunlight.
5. Plug only into properly grounded sockets.
6. Keep the main plug freely accessible at all times.

## 7.2. Preparation

1. Inspect the rotor, buckets, and accessories for signs of corrosion, cracks, or removed protective coating; do not use damaged components (Thermo Fisher Scientific, 2016).
2. Do not modify the mechanical components of the rotor or alter any electronic components of the centrifuge.
3. Load the rotor properly: always balance samples symmetrically.
4. Never overload the rotor beyond its rated capacity.
5. Verify that the rotor is locked securely into place before closing the door.
6. When working with corrosive samples, ensure tubes are fully sealed.

### Hazardous Substances

- Do not centrifuge explosive or flammable materials.
- Do not centrifuge toxic, radioactive, or pathogenic materials without appropriate safety precautions and sealed rotor lids (World Health Organization, 2020).
- The centrifuge is neither inert nor explosion-protected; never operate in an explosion-prone environment.
- Use fully sealed tubes for highly corrosive substances that could impair rotor mechanical stability.

## 7.3. Operation

1. Close the centrifuge door before starting a run.
2. Set the desired speed, temperature (8R model), and time using the control panel.
3. Press START to begin the run.
4. Do not move, lean on, or place anything on top of the centrifuge while it is running.
5. Minimize time spent near the centrifuge during operation (Thermo Fisher Scientific, 2016).
6. Wait until the rotor has come to a complete stop and the display confirms it before opening the door.
7. Never open the centrifuge while the rotor is spinning.

### Emergency Stop

Press the STOP key to shut down the centrifuge at any time. In an emergency, pull the power supply plug to disconnect power immediately (Thermo Fisher Scientific, 2016).

## 7.4. Shutdown and Cleanup

1. Remove samples promptly after the run is complete.
2. Inspect the rotor and chamber for spills or condensation.
3. If corrosive samples were centrifuged, clean the rotor, buckets, and chamber thoroughly with deionized water and dry before storage (Thermo Fisher Scientific, 2016).
4. If toxins or pathogenic substances have contaminated the centrifuge, carry out appropriate disinfection before further use (World Health Organization, 2020).

5. Wipe down the exterior of the centrifuge.
6. Leave the door slightly ajar to allow the chamber to dry (if no hazardous residues are present).

### 7.5. Cover Panel and Door Safety

1. Never operate the centrifuge if cover panels are damaged or missing.
2. Do not attempt to bypass the door interlock mechanism.
3. If mechanical failure occurs (rotor or bucket crash), the centrifuge is not aerosol-tight; leave the room and contact the lab manager (World Health Organization, 2020).

## 8. Quality Control and Acceptance Criteria

- Visually inspect the rotor and accessories before each use for cracks, corrosion, or wear (Thermo Fisher Scientific, 2016).
- Verify that samples are properly balanced before every run.
- Confirm the door closes and latches securely.
- Report any unusual vibrations, noises, or error messages to the lab manager immediately.
- Follow the manufacturer's maintenance schedule in the instruction manual (Thermo Fisher Scientific, 2016).

## 9. Waste Disposal

| Waste Type                      | Disposal Method                                                           |
|---------------------------------|---------------------------------------------------------------------------|
| Contaminated cleaning materials | Dispose per <a href="#">SOP-L003</a> if hazardous chemicals were involved |
| Damaged rotors or accessories   | Contact lab manager for proper disposal                                   |
| Biohazardous spill materials    | Autoclave before disposal                                                 |

## 10. References

- Thermo Fisher Scientific (2016)
- World Health Organization (2020)
- APHA et al. (2012)

APHA, AWWA, & WEF. (2012). *Standard methods for the examination of water and wastewater* (22nd ed., p. 1360). American Public Health Association.

Thermo Fisher Scientific. (2016). *Sorvall ST8 and ST8R centrifuge: Instruction manual*. <https://www.thermofisher.com/us/en/home/life-science/lab-equipment/centrifuges/benchtop-centrifuges/sorvall-st8.html>

World Health Organization. (2020). *Laboratory biosafety manual* (4th ed.). World Health Organization. <https://www.who.int/publications/i/item/9789240011311>

## 11. Related SOPs

| SOP                  | Title                    | Relationship                              |
|----------------------|--------------------------|-------------------------------------------|
| <a href="#">L002</a> | Laboratory Safety        | Required prerequisite                     |
| <a href="#">L003</a> | Hazardous Materials      | Chemical and biological spills            |
| <a href="#">L403</a> | KCl Extraction           | Uses centrifuge for soil extraction       |
| <a href="#">L409</a> | Microbial Biomass Carbon | Uses centrifuge for extract clarification |

## 12. Training Record

Before operating the Sorvall ST8R centrifuge independently, personnel must:

1. Read this SOP in full
2. Complete [SOP-L002 Laboratory Safety](#) training
3. Review the manufacturer's instruction manual (Thermo Fisher Scientific, 2016)
4. Observe a trained operator perform rotor loading, a centrifuge run, and post-run cleanup
5. Demonstrate proper sample balancing, rotor installation, and emergency shutdown under supervision
6. Be signed off by the PI or lab manager