

Centrifuge Safety Standard Operating Procedure

Revision: May 11, 2022

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Description [Provide additional information as it pertains to your research protocol]

Centrifuges are machines used to separate solids from liquids in a suspension. The spinning motion of a centrifuge produces centrifugal forces that separate substances of greater and lesser densities.

Process [Write the steps for using the equipment in your research protocol]

Potential Hazards [Provide additional information as it pertains to your research protocol]

The speed in which a centrifuge operates makes it a potential hazard if it is not maintained and assembled correctly. The following potential hazards are present when using a centrifuge:

- Exposure to biological substances, chemicals, or radioactive material.
- Injury
- Damage to equipment and lab space.
- Loss of research data and research time.

Engineering Controls [Provide additional information as it pertains to your research protocol]

Engineering control measures include room design, ventilation systems, and lab and emergency response equipment.

Laboratory work with centrifuges should be performed in the appropriate designated area or room with controlled access and at the pre-determined bench areas.

Biological Safety Cabinets and Chemical Fume Hoods

Fill and decant all centrifuge tubes and bottles, when applicable, in the Biological Safety Cabinet (BSC) or chemical fume hood.

Bottles and Tubes

When centrifuging hazardous materials, use appropriate screw or click-seal capped tubes, or bottles. Inspect before use for cracks and stress marks.

Biocontainment

When centrifuging biohazardous materials, use centrifuge safety cups and/or sealed lids for rotors. When

centrifuging plates, ensure to use plate covers and safety cups, parafilm or plate sealing film.

In Lieu of Safety Cups

To prevent aerosol exposure when centrifuging biohazardous materials in case of a tube failure or other problem during spin, please follow one of the steps listed below.

Option 1: When the spin cycle is complete wait an additional 2 minutes to allow any potential aerosols to settle.

Option 2: wrap tubes/plates with parafilm.

Option 3: Other approved method; such as spinning a small tube inside a larger tube (secondary container).

Work Practice Controls [Provide additional information as it pertains to your research protocol]

To maintain the integrity of the centrifuge and to keep your laboratory research and personnel safety, consult the operator's manual for the centrifuge you are using. The operator's manual will provide work practice controls specific to the centrifuge make and model.

Also, consult the manual for the recommended tubes and bottles to ensure they are compatible with the hazardous substances being used.

Inspecting the Centrifuge, Rotor, Bottles, and Tubes

- Confirm that the centrifuge and rotor are part of the same manufacturer and centrifuge system.
- Inspect the rotor and tube cavities for signs of damage and discontinue use if damaged.
- Inspect the speed disk for signs of damage if using an ultra-speed rotor and discontinue use if damaged.
- Verify that the bottles and tubes are chemically compatible with the sample and that they can achieve maximum speed needed.
- Inspect bottles, tubes, and O-rings (lubricate with vacuum grease, if needed) for signs of damage (i.e. cracks or discoloration) and discontinue use if they are damaged.
- Check all O-rings for nicks and cracks visually and by feeling them. The O-rings must be in their proper position to be effective.

Loading Centrifuge Tubes, Bottles, Adapters, and Rotor

- Follow manufacturer's filling limits for tubes. Do not overfill or underfill tubes.
- The maximum for general purpose centrifuge tubes is 3/4 full.
- When using the centrifuge for biohazardous substances and where applicable, fill, load and remove tubes, bottles, and rotors inside the BSC.
- Disinfect the outside of the tubes, bottles, and rotors after filling them using an appropriate surface disinfectant (i.e. 10% bleach followed by 70% ethanol).
- Seal tubes, bottles, adapters, and buckets carefully before moving to centrifuge.
- Check that the rotor is tightly in place.

Operating the Centrifuge

- Balance centrifuge: Follow manufacturer's instructions for proper centrifuge balancing steps.
- Start run

- Do not leave the centrifuge until full operating speed is reached and it appears to be running safely without incident.
- Stop the centrifuge immediately if you notice any unusual noises or shaking. Confirm the rotor is balanced.

NOTE: To prevent rotor failure, do not exceed maximum speed and maximum mass limits for the rotor. You must reduce rotor speed if sample density calculations indicate maximum mass limits will be exceeded; contact manufacturer for guidance.

- If applicable, record the run date, duration, speed, total rotor revolutions, and rotor condition in the log book.

Removing a Sample

1. **Stop run:** Ensure centrifuge comes to complete stop before opening cover. When centrifuging hazardous materials, wait at least 2 minutes after run to allow aerosols to settle before opening centrifuge.
2. **Check for leaks/spills:** In samples, rotor, biocontainment lids/buckets, and centrifuge well.
3. **Open sealable tubes/biocontainment lids/rotors:** Wear appropriate PPE and open the tubes, biocontainment lids, or rotors inside the fume hood or biosafety cabinet, depending on hazard.

Cleaning the Rotor

Clean the centrifuge and rotor to prevent corrosion. Corrosion is caused by long-term exposure to moisture or chemicals. It can cause undue stress, compromising the safety of the centrifuge.

- Clean rotor after each use and at least once a week using a gentle dish detergent and sanitize using an appropriate surface disinfectant (i.e. 70% ethanol or a Microcide™).

NOTE: Do not use bleach. It will strip layer off the material or discolor the rotor.

- Use plastic brushes to clean tight spaces.

NOTE: Do not use metal brushes. This will scratch and damage rotor tube cavities.

- Rinse thoroughly with de-ionized water.
- Air dry upside down.
- Store on a shelf.

Cleaning the Centrifuge

- Cleaning the Centrifuge
- Wipe down frequently.
- Wipe the top and control panel.
- Wipe the centrifuge cavity with a gentle dish detergent.
- Rinse thoroughly with de-ionized water.
- Disinfect the centrifuge with an appropriate surface disinfectant (i.e. 70% ethanol or a Microcide™).
- Dry with a clean cloth.

Maintaining the Centrifuge and Components

Maintain, take care, of the centrifuge and components to prevent equipment failure (resulting from surface or stress corrosion) that may cause exposure, injury, or damage to your equipment and lab space.

- Ensure that all the parts of the centrifuge and rotor are part of the same manufacturer and centrifuge system.

- Clean rotor each week and after each use.
- Lubricate rotor and components as indicated in the rotor manual.
- Replace rotor and components when evidence of pitting, rough spots, cracks, or discoloration is noted.
- Replace O-rings when the O-rings contain cuts, abrasions, or flat areas.
- Replace over speed disk when damaged in ultra-speed units.
- Check that the rotor is tightly in place at each use or at least once a week.

Preventive Maintenance

- Establish preventive maintenance schedule: Including regular cleaning of centrifuge interior to prevent damage and avoid costly repairs. Reference centrifuge operator's manual or contact manufacturer for guidance.

NOTE: Only qualified service technicians should inspect, repair, and adjust centrifuges. See the centrifuge operator's manual for suggested inspections and maintenance schedules.

- Maintain log book: For all high speed centrifuges and ultracentrifuges include the following information:
 - Run dates
 - Durations
 - Speeds
 - Total rotor revolutions
 - Notes on rotor condition
- Retire rotors after the manufacturer's recommended life span except where annual stress tests demonstrate absence of structural flaws.

NOTE: Rotor life span may be reduced or warranty voided if autoclaved; contact manufacturer for guidance.

Personal Protective Equipment (PPE) [Provide additional information as it pertains to your research protocol]

Appropriate personal protective equipment (PPE) **must** be worn. Lab coats **must** be buttoned. Gloves should be pulled over the wrists of the coat, not worn inside the coat. Additional PPE to be used as recommended:

- Proper eye protection (safety glasses or goggles)
- Gloves that are appropriate for the present hazard
- Lab coat
- Close-toe footwear

Transportation and Storage [Provide additional information as it pertains to your research protocol]

Store rotor on a shelf or table top.

Waste Disposal [Provide additional information as it pertains to your research protocol]

Centrifuge Disposal

- For biohazardous materials, clean/disinfect centrifuge using an appropriate surface disinfectant (i.e. 70% ethanol or a Microcide™).



- Remove/cross out biohazard sticker.
- For radioactive materials, request radiation safety survey and signage before disposal of centrifuge.
- Attach the [Laboratory Equipment Owner Decontamination Form](#).

Training of Personnel

All personnel are required to complete Centrifuge and Rotor Safety Training EHS_BLS023w_TAB via [My LINC](#). Furthermore, all personnel shall read and fully adhere to this SOP when operating a centrifuge.

Certification

I have read and understand the above SOP. I have received approval from my Lab Director to perform this procedure. I agree to contact my Lab Director if I plan to modify this procedure.

Name	Signature	UMID #	Date



Revision History (Do not print as part of SOP)

05/11/2022	Partial Revision	Removed emergency response procedures section (LGS)
04/07/2022	Annual Revision	Reviewed and updated. (CO)
04/15/2020	Partial Revision	Updated editing rights to headings (RSH)
03/04/2019	Annual Revision	Reviewed and updated.
09/12/2018	Partial Revision	EHS name and logo were added, updated the formatting, and revised the content under Exposure/Unintended Content (AKJ).
06/01/2018	Partial Revision	Changed format; Added content about cleaning a centrifuge, how to maintain the centrifuge and its components, and how to store the rotor.