

Use of Centrifuges

These are vital pieces of lab equipment however when they are misused they have the capability to [destroy](#) a laboratory.

Centrifuges can be used to separate materials, they can be used as part of a protocol involving spin-columns for small-scale purification, they can be used with protein concentration columns.

Centrifuges are manufactured by a variety of companies and may therefore not operate in the same manner. It is essential to read the operating manual and be trained on the machine before using it.

Normal operations

Some general rules are

- **Always** ask the owner of the centrifuge before you use it, or ask a senior staff member.
- You must request the permission of the owners of high-speed and ultra-centrifuges and explain what work you are doing before you use the machine.
- The centrifuge must be stably mounted and level in all axes. The greater the required G the more important the stability.
- The air flow around centrifuges must not be blocked particularly when operating at high speed to avoid overloading the cooling system.
- Make sure that the correct rotor for the machine is selected and that it is in date. Some companies stamp expiry dates on the rotors after which they should not be used.
- You should always select a rotor that is compatible with the temperature that you will be centrifuging your samples at as some rotor heads cannot be used below 0°C
- Examine the external and internal surface of the rotor for scratches, damage or a flaking surface finish. – If the finish is damaged do not use the rotor.
- Ensure that all inserts for the rotor are present and are matched to each other by size and weight.
- Ensure that the centrifuge tubes are compatible both with the type of rotor used and the speed of centrifugation selected as tubes in a swing out rotor may only be able to withstand a quarter of the G generated by a fixed angle rotor (shown below).



Swing out rotor



Fixed angle rotor

- Select matched sets of centrifuge tubes e.g. Polycarbonate or Polypropylene
- Only use matched pairs of metal centrifuge tubes if required.
- Ensure that the buckets, bottles or tubes that are used are not over-loaded or over-filled and that they are in good condition without visible streak marks on the surface.
- If you are centrifuging human material or Bio-Hazard Group 2 or Bio-Hazard Group 3 biological agents then centrifuge buckets with lids & intact sealed O-rings must be used. The rotor should be loaded and unloaded in a microbiological safety cabinet (MSC). It is important to minimise the production of aerosols during centrifugation.
- Tubes, bottles or buckets that are positioned opposite each other must weigh the same.
- Ensure that the buckets / bottles are balanced to the limit given in the operating manual including the lids, inserts and O-rings. An imbalance of 0.5 gram at 1 G is roughly equivalent to 250 kilograms at 500,000 G's and will cause a centrifuge to move.
- DO NOT EXCEED THE MAXIMUM WEIGHT OF THE ROTOR.
- Ensure that the rotor is securely mounted on the drive shaft. Some rotors have lugs that need to be connected to the drive shaft.
- DO NOT EXCEED THE MAXIMUM QUOTED SPEED / RCF MARKED ON THE ROTOR.
- Using a rotor at higher than its maximum rating is very likely to cause it to deform risking damage to the centrifuge.
- Log the speed, RCF, temperature of the run.
- Never over-ride the safety interlocks or braking systems on a centrifuge: They are there for your protection.
- When you are finished with the centrifuge, allow it to come to ambient temperature, clean and dry it. Non-abrasive cleaners should be used so that the interior is not damaged.
- Before decontaminating a centrifuge with Decon 90 or other cleaner such as Virkon after a spill or breakage, contact your supervisor or laboratory manager.

- Clean and dry the rotor and store it in a clean, dry area until needed.

Removing centrifuged samples

- Human or material of biohazard groups 2 or 3 should be removed from centrifuged tubes in a Microbiological Safety Cabinet.
- It is best to aspirate the supernatant using a micropipette or a pipette depending on the size of the sample. It is important to minimise the formation of aerosols. If aerosols are formed place the items on the cabinet work surface and leave the cabinet for 30 minutes. You should contact your supervisor to let them know a problem has occurred.
- When re-suspending the pellet (sedimented layer) from a centrifuge it is always best to use a gentle swirling motion rather than shaking as this reduces the likelihood of aerosols being form.

Accidents / incidents

Odd / Unusual sounds

- If the centrifuge is making an odd or unusual sound, turn off the power from the wall if possible and then contact your supervisor or either of the lab managers or the SHE Office.

Vibrations

- If the centrifuge appears to be moving / vibrating, turn off the power from the wall if possible and then contact your supervisor or lab manager.
- If the vibrations or movements seem to be large, tell other people in the area to move away and contact your supervisor or lab manager giving details of the problem. Never ignore a vibrating or moving centrifuge.

Breakages

- If you can hear the sound of a centrifuge tube breaking, turn off the centrifuge and allow it to stand for 30 minutes. Contact your supervisor or lab manager about the problem.
- If you are centrifuging human material or biohazard group 2 or 3 material, the rotor must be taken to a Microbiological Safety Cabinet (MSC) & left for 30 minutes, prior to opening. You should contact you supervisor especially if the samples contain a large number of cfu's (colony forming units) or the primary route of infection is by inhalation. You should take care when removing broken tubes from the rotor in order to avoid a skin puncture occurring.

Further Information on the use and care of centrifuges

More information on the use and care of centrifuges can be obtained from the [Beckman Coulter](#) and [Thermo Scientific](#) websites amongst others.

Location of High Speed and Ultra centrifuges

Machine type	Maximum speed	Location
Sorvall RC 5B plus	21000 rpm	Floor 2, corridor 1, Room 24
Sorvall RC 5B plus	21000 rpm	Floor 2, corridor 1, Room 23
Beckman Ultra centrifuges		Floor 2, corridor 1, Room 23
Beckman Avanti J26 XP	26000 rpm	Floor 2, corridor 1, Room 23
Sorvall RC5B	21000 rpm	Floor 2, corridor 3 Room 43

Emergency Contact Information

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