# **Standard Operating Procedure (SOP) Title: Use of Centrifuge and microcentrifuge**

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| Assessor: | Joshua Linfoot | | | Location of work: | MSRH 502 |
| Principal Investigator: | | | Prof Alan Spivey | | |
| Date of approval: | | 13/09/2021 | | Date for review: | 13/09/2022 |

## **Justifying the hazards:**

Use of centrifuge involves the following hazards: manual handling (contact with rotating parts and weighty equipment itself), electrical, mechanical (failure of rotor, tube, bucket (often destructive)), contact with hazardous substances and imbalance of the machine during operation. Centrifuge operates at room temperature.

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| Identify hazards with specific risk assessments and a College or a departmental approval process | | | |
| [Ionising radiation sources](https://www.imperial.ac.uk/safety/safety-by-topic/laboratory-safety/) |  | [Biological sources](https://www.imperial.ac.uk/safety/safety-by-topic/laboratory-safety/) (microorganisms, human/animal tissues, plants) |  |
| [Class 3R, 3B or 4 Lasers](https://imperiallondon.sharepoint.com/sites/fons/faculty/safety/lasers/SitePages/laserhome.aspx) |  | [Offsite work](http://www.imperial.ac.uk/safety/safety-by-topic/off-site-working/) |  |
| Confirm if [Lone working](https://www.imperial.ac.uk/safety/safety-by-topic/lone-working/) is permitted with this SOP?  If it is permitted, describe the control measures for lone workers: | | | |

## **Preparing for the SOP:**

* **DON’T** use faulty or damaged equipment until it is repaired.
* **DON’T** leave equipment unattended for prolonged periods of time
* **DO** always balance the centrifuge tubes (by weight, not just by eye), and put the balanced tubes in opposing positions in the rotor. Rotor imbalance can cause catastrophic failure of centrifuge (explosion), injuring user and others around.
* **DO** regularly inspect rotor (in a safe manner with power off), replace when damaged.
* **DO** use the correct tubes for the sample type, and do not use cracked or broken tubes.

## **Procedure:**

### Before the procedure:

1. Wear eye protection and lab coat due to risk of spray or spillage of contents.
2. Always wear nitrile gloves when handling the rotor and centrifuge.
3. Do not overfill a centrifuge tube to the point where the rim, cap or cotton plug becomes wet.
4. Always balance buckets and tubes rotors properly before centrifugation.
5. Use sealed tubes and safety buckets that seal with an O-ring.
6. Do not use harsh detergents to clean rotors (especially aluminium rotors). Use a mild detergent and rinse with de-ionized water.
7. Do not leave the centrifuge until full operating speed is attained and machine appears to be running safety without vibration.
8. Never attempt to open the lid of a centrifuge or slow the rotor by hand while the rotor is in motion as serious injuries may be incurred.
9. Do not use aluminium foil to cap a centrifuge tube. The foil may rupture or detach.
10. Do not operate the centrifuge without the appropriate rotor cover/bucket lids securely fitted and the seals in place (no more than 2/3 full).

### For the procedure:

1. Switch the centrifuge ON. Open the chamber door fully. Ensure the door stays open! The lid dropping down can lead to a serious crushing accident!
2. Install the rotor by placing the rotor base onto the drive spindle. Check that it is securely fitted and centrally located onto the spindle
3. Place the rotor cover onto the rotor base and lock the cover and rotor into place.
4. Check that the rotor is firmly attached by attempting to lift it off the spindle. You should not be able to do this. If you can, open the rotor, and re-position following the same procedure as above.
5. Close the chamber door and use the Run Screen to program in the required parameters.
6. Close the lid gently when ready to begin centrifuging and press the Start button to begin the run.
7. Once the run has ended, the machine will slowly stop, but the door will remain closed. Ensure the machine is stopped! Open the door, remove your rotor and samples.
8. Switch off the machine.

### After measurement:

1. Clean out the rotor with 70% ethanol if there have been any leaks. Do not use bleach – this will corrode the rotor. Leave the rotor upside down back in the correct storage location to drain out any residual ethanol.
2. Since corrosion is the main cause of rotor failure, it’s crucial to remove all the liquid spilt after any spillage.

## **Disposal:**

If the equipment is to be disposed of ensure it is decontaminated, and then disposed of via the ‘Waste Electrical and Electronic Equipment route ([WEEE](http://www.imperial.ac.uk/estates-facilities/buildings/services/waste-disposal/waste-disposal-forms/weee-forms/))’.

## **Personal Protective Equipment (PPE):**

Lab coat, appropriate gloves, safety glasses

## **Risk Analysis of SOP and emergency procedures:**

(In addition to [Safe Lab Practice](https://imperiallondon.sharepoint.com/sites/fons/faculty/safety/SitePages/Basic%20Laboratory%20Rules%20for%20All%20Laboratories%20in%20FoNS.aspx))

### **Always remember to include fire associated risks and control measures where appropriate**

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| Hazard | Raw risks | Current control measures | Residual risk  (Low/Med/High) |
| Heavy item, lid is not locked in the open position. | Crushing injury | Equipment securely located on suitable work surface.  Open the lid fully.  No lifting or moving of equipment by user. | Low |
| Experiment content (equipment specific hazard) | Sample pan explosion due to pressure build up inside the pan | Carry out COSHH assessment for hazardous substances and SOPs for all experiments conducted using the equipment.  Always close the lid of the sample cell. | Low/Med/High depending on the SOP |
| Electrical equipment and cables | Electrocution and electrical fire | Commercial equipment - do not modify.  Ensure regular portable appliance testing (PAT).  Visual inspection of equipment and cables prior to each use.  Immediate clean of any spills.  Ensure plugs, sockets, cables and equipment positioned so as not to be at risk of ingress from liquids.  Ensure a CO2 extinguisher is available.  Ensure easy access to the power supply. | Low |
| Cold surfaces, as the temperature could go down to | Burns | Use slip-resistant insulated thermal gloves for handling hot samples. | Low |

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| **Additional control measures to minimise residual risks** | **Implementation date** |
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| **Who may be harmed** | |
| Staff / students | Cleaners / Engineers |
| Supporting staff | Others (specify): |

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| **Emergency procedures** – describe the response(s) required by the user and lab members |
| In the event of an incident involving the **equipment itself,** turn off the power supply, unplug and place a sign on the equipment stating it is not to be used. Arrange for repair.  **Electrical shock** - switch off power. Do not touch the affected individual until the power is off. Seek immediate medical attention by calling 4444 (+44 20 7589 1000) and contacting nearby First Aider. Use a non-conductive lever to remove the individual from the electrical source (e.g. a dry wooden broom handle).  **Fire** – If ignition occurs but extinction is managed in a controlled manner, ensure a SALUS report is completed at the earliest opportunity. If the fire is not controllable you must activate a fire alarm call point and evacuate. Inform Fire Safety Officers or Security where the fire is located and what it involves when they arrive at the building.  **Burns** - run site of injury under tepid water for 15 minutes if able (burn dressing available in first aid kits if location of the injury is awkward to rinse, e.g. on leg) and contact a first aider. In the case of a serious burn, seek medical attention immediately.  If **crushing injury** - contact first aider immediately – use ice/cool pack (if on hand only) to reduce immediate swelling – seek medical attention if required.  **Chemical spills and exposure to hazardous substances** - dependant on the nature of the chemical. Specific procedures will be outlined on an individual basis on the relevant COSHH form. |

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| Recommended trainings and records: |
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| List of individuals competent to demonstrate safe work practice and train others (level 1 trainers): | Names of those that have been trained and can work unsupervised (level 2) and date training completed: |
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