



**LOCATION DETAILS**

**School/Branch:** School of Molecular & Biomedical Science

**SAFE OPERATING PROCEDURE DETAILS**

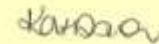
Safe Operating Procedures for Beckman Optima L-100 XP, Optima TLX-120 and TLX-100 Ultra Centrifuges

Date Prepared:  
14/09/2010

**PREPARED BY:** Name, position, & Signature (insert names of supervisor, HSO, subject matter expert)

Tony Richardson – School Infrastructure Coordinator  
Kate Dixon – School Health & Safety Officer

Signature:



**RISK ASSESSMENT**

Has a risk assessment been completed and all other environmental considerations been made?

YES

See risk assessment dated:

09/02/2010

Risk Rating:

Low  
Medium  
High  
Very High

**RISKS IDENTIFIED**

- Exposure to biological substances/chemicals through tube leakage
- Machine damage and potential injury due to rotor imbalance
- Machine damage and potential injury due to rotor attachment
- Rotor Failure

**SAFETY PRECAUTIONS**

The following control measures **MUST** be adhered to:

- **All users must undergo formal training in Ultra Centrifuges and the records kept and documented in the Training Needs Analysis**
- **All use of centrifuge rotors must be entered in the log book.**
- All rotors must undergo a Periodic Rotor Inspection as organised by the Infrastructure Coordinator.
- Centrifuge lids must never be opened while the rotor is in motion .
- After centrifugation an aerosol will form above the sample, in the tube. Depending on the hazard status of the sample (e.g. Pathogenic microorganisms or hazardous chemicals), appropriate controls may be needed.
- When starting a centrifuge run: always remain with the centrifuge for a minute or two to see all is operating well.

**PERSONAL PROTECTIVE EQUIPMENT REQUIRED**

The following PPE must be worn at all times:

- Gloves, Safety Glasses and Lab Coat

**SAFE OPERATING PROCEDURE**

## Use of Ultra Centrifuges & Rotors

The School currently has 3 Optima ultra-centrifuges in use: one floor standing Optima L-100 XP and one bench top Optima TLX-120 and one bench top TLX-100. With them we have 13 rotors. Below is a list of each rotor and the centrifuges that are available for them together with a brief description of each rotor.

### Procedure for using ultracentrifuges:

All centrifuges and rotors are available to all Department Staff/Students who have been trained to use them. Lab Supervisors must ensure their staff/students have received training from a person competent to train ultra centrifuge users.

Tony Richardson is available to advise who is competent to train Ultra-centrifuge users. Specific training will be needed for different types of rotor and tube.

### Booking Sheet

Each centrifuge has a booking sheet and a Log Book. **For reasons of service, warranty and safety it is essential that the log book be completed for every run on an ultracentrifuge.** Booking sheets enable users to book rotors and centrifuges for the time they expect to need to use them; booking sheets should be filled in so that other users know where and till when that rotor is in use.

### Current ultracentrifuge equipment:

Room	Centrifuge Rotor	Rotor Type	Number of Tubes	Tube Capacity mls	Max. g	Max. rpm	Centrifuge
4.52	Type 80Ti	Fixed Angle	8	13.5	602,000	80,000	Optima L-100 XP
4.52	Type 70.1Ti	Fixed Angle	12	13.5	450,000	70,000	Optima L-100 XP
4.52	Type 70Ti	Fixed Angle	8	38.5	540,000	70,000	Optima L-100 XP
4.52	Type 60Ti	Fixed Angle	8	38.5	362,000	60,000	Optima L-100 XP
4.52	Type 55.2Ti	Fixed Angle	10	38.5	340,000	55,000	Optima L-100 XP
4.52	Type 50Ti	Fixed Angle	12	13.5	226,000	50,000	Optima L-100 XP
4.52	Type 45Ti	Fixed Angle	6	94	235,000	45,000	Optima L-100 XP
4.52	Type SW60Ti	Swing Out	6	4.4	485,000	60,000	Optima L-100 XP
4.52	Type SW40Ti	Swing Out	6	14	285,000	40,000	Optima L-100 XP
4.52	TLA100	Fixed Angle	20	0.2	436,000	100,000	TLX-120 & TLX-100
4.52	TLA100.4	Fixed Angle	8	5.1	543,000	100,000	TLX-120 & TLX-100
4.52	TLN100	Near Vertical	8	3.9	450,000	100,000	TLX-120 & TLX-100
4.52	TLS55	Swing Out	4	2.2	259,000	55,000	TLX-120 & TLX-100

### Tube Selection

For the Fixed Angle Rotors, the most popular tube is thick walled polycarbonate tube with the three piece noryl or aluminium/noryl cap. These have a limit to top speed and can be used part filled up to certain speeds (see table below). Thin wall tubes are available for these rotors but can only be used completely filled. There are a large number of different types of tube available to use, each present special conditions that must be allowed for; always consult the manual before using any tube.

Tube	Max Speed Filled	Max Speed Part Filled	Minimum Part Fill Volume
13.5	65,000	60,000	5
38.5	60,000	50,000	16
90	45,000	35,000	15

- Only thin walled tubes are used in Swing Out rotors. Because of the geometry of these rotors, tubes can be run part full. As always: the chemistry of the sample must be compatible with the tube material.

### Tube Balance

- Because of the high speeds balance of the tube pairs is vital. The best plan is to load all the tubes to exactly the same weight.  
There must be no stick-on labels on the centrifuge tubes.

### Tube and Rotor Sealing

- Ultracentrifuges run under high vacuum, it is vital that the tubes and the rotor are sealed to gas tight level. The tube cap O ring and all rotor O rings must be in place and in good condition.

### **Rotor Temperature**

- The Ultracentrifuge measures the temperature of the rotor directly; it will not start the run until the temperature of the rotor is within the selected parameters. Always pre-cool the Rotor in a refrigerator, to the required temperature.

### **Mounting the Rotor and Running the Centrifuge**

#### **1. Optima L-100 XP**

#### **Fixed Angle Rotor**

1. Place the balanced tubes into the (pre cooled if appropriate) rotor and put on the lid, screw down the Handle to secure the lid.
2. Ensure the Key is in the Normal position
3. Turn on the centrifuge open the lid and insert the rotor. There are no drive pins on the Optima L-100 XP and the rotor just slides on to the drive shaft; close the lid.
4. Enter speed, time, temperature and acceleration parameters then press enter and start (within 5 seconds of pressing enter)
5. The machine will start rotation but will not go to full speed until the vacuum reaches the required level.

#### **Swing Out Rotor**

1. Place the tubes in the buckets and balance
2. Screw down the bucket cap onto the rubber seal
3. Place the bucket onto the rotor so the bucket number corresponds to the numbered position on the rotor.
4. Ensure the Key is in the Normal position
5. Turn on the centrifuge open the lid and insert the rotor. There are no drive pins on the Optima L-100 XP and the rotor just slides on to the drive shaft; close the lid.
6. Enter speed, time, temperature and acceleration parameters then press enter and start (within 5 seconds of pressing enter)
7. The machine will start rotation but will not go to full speed until the vacuum reaches the required level.

#### **2. Optima TLX-120 and TLX-100**

1. Place the balanced tubes into the (pre cooled if appropriate) rotor and put on the lid, screw down the lid.
2. Turn on the centrifuge open the lid and insert the rotor. Press down the button in the centre of the rotor lid to secure the rotor to the drive shaft
3. Enter speed, time, temperature and acceleration parameters then press enter and start (within 5 seconds of pressing enter)
4. The machine will start rotation but will not go to full speed until the vacuum reaches the required level.

### **ADMINISTRATION**

Note: This Safe Operating Procedure must be reviewed :

- a) after any accident, incident or near miss;
- b) when training new staff;
- c) if adopted by new work group;
- d) if equipment, substances or processes change; or
- e) Within 5 years of date of issue.