

## **CENTRIFUGE SAFETY**

### **Up-dated October 2011**

#### I. Principle:

- Rotors on high-speed centrifuge and ultracentrifuge units are subject to powerful mechanical stress that can result in rotor failure. In addition, improper loading and balancing of rotors can cause the rotors to break loose while spinning. For these reasons, centrifuges must be properly used and maintained.

#### II. Training and Repair

1. Before using any centrifuge, review the owner's manual.
  - a. If a manual is not available, obtain a copy from the manufacture.
  - b. Do not operate a centrifuge until you have read the owners manual and have been shown proper operations by an experiences operator
2. Centrifuges should be repaired only by the manufacturer or authorized dealer representative.
  - a. Do not attempt repairs yourself. Centrifuges in need of repair should be tagged and locked-out while awaiting service
3. Familiarize yourself with emergency and log book maintenance procedures prior to operation

#### Rotor Care

- 1) If the rotor is not kept clean and chemicals remain on the rotor, corrosion will result.
  - a. Moisture left for an extended time can also initiate corrosion. It is important that the rotor is left clean and dry after use. (Wash with mild detergent and warm water using a nylon bottle brush if necessary).
  - b. Dry the rotor thoroughly and store upside down with the cover and tubes removed.
- 2) Do not autoclave rotors at temperatures above 100°C
- 3) To avoid corrosion, do not expose aluminum rotor components to strong acids or bases, alkaline lab detergents or salts (chlorides) of heavy metals (e.g., cesium, lead, silver, or mercury)
- 4) Check that the centrifuge chamber, drive spindle, and tapered mounting surface of the rotor are clean and free of scratches or burrs
- 5) Make sure the rotor itself is clean, corrosion and crack free, and that there are no scratches or burrs around its rim
- 6) Damaged rotors must not be used
- 7) Wipe drive surfaces prior to installing the rotor
- 8) Make sure rotor, tubes, and spindle are dry and that the rotor is properly seated and secured to the drive hub.
  - a. Do not operate the centrifuge without the appropriate rotor cover securely fitted with seals in place.
    - i. 9. If the temperature of the chamber is below room temperature, pre-cool the rotor to the lower temperature before securing the rotor (this will minimize, the chance of it seizing to the tapered spindle)
  - b. 10. Always complete the machine log book since the umber of hours of operation determines the life of the rotor

- c. 11. High-speed rotor heads are prone to metal fatigue. Each rotor should be accompanied by its own logbook indicating the number of hours run at top or derated speeds.
  - d. Do not exceed the design mass for the maximum speed of the rotor. Failure
    - i. to observe this precaution can result in dangerous and expensive rotor
    - ii. disintegration
- 9) Never exceed the maximum stated speed for any rotor
- 10) De-rate the rotor speed whenever
- a. the rotor speed/temp combination exceeds the solubility of the gradient
    - i. material and causes it to precipitate or
  - b. the compartment load exceeds the maximum specified. Failure to reduce
    - i. rotor speed under these conditions can cause rotor failure
- 11) Balance the rotor to within the limits specified (take care that materials of similar
- i. densities are in opposite positions of the rotor

### Tube Care

- 12) Before use, tubes should be checked for cracks. The inside of cups should be inspected for rough walls caused by corrosion and adhering matter should be removed. Metal or plastic tubes (other than nitrocellulose) should be used whenever possible
- 13) Make sure each tube compartment is clean and corrosion free
- 14) Tubes must be properly balanced in rotor ( $\frac{1}{2}$  gram at 1 G is roughly equivalent to 250 Kg @ 500,000 G's)
- 15) Check compatibility of tube material to solvent medium (some solvents may cause the tubes to swell or crack in the rotor)
- 16) Never fill centrifuge tubes above the maximum recommended by the manufacturer
- 17) Use only correctly fitting tubes
- 18) Use sealed rotors, sealed buckets, or a guard bowl cover complete with gasket as well as safety centrifuge tubes (tube or bottle carrier with sealable cap or "O" ring cap)
- 1.

### Miscellaneous

- 19) Once a run is complete, make sure the rotor has COMPLETELY STOPPED before opening the centrifuge lid. Never attempt to open the lid of a centrifuge or slow the rotor by hand or open the lid while rotor is in motion as serious injuries may result
- 20) If a tube breaks, the centrifuge should be turned off, allowed to stand undisturbed for 15 minutes before opening. Clean and disinfect the rotor. If infectious material was placed in the centrifuge, plan proper decontamination and cleanup. Cleaning and disinfection of tubes, rotors and other components requires considerable care. No single method is suitable for all items, and the various manufacturer recommendations must be followed to avoid rotor fatigues, distortion and corrosion
- 21) After use, tubes, rotors, and centrifuge interiors should be cleaned and/or disinfected
- 22) Clean up spills immediately, using appropriate spill response procedures