Laboratory Equipment Safety: Centrifuges

What’s at Stake?

A laboratory was seriously damaged when the rotor of an ultracentrifuge failed while in use. Flying metal fragments damaged walls, the ceiling and other equipment. The shock wave blew out the laboratory’s windows and shook down shelves.

Fortunately, the room was not occupied at the time and there were no personal injuries. The cause of the accident is believed to be the use of a model of rotor that was not approved for use in the specific model of centrifuge.

Here are some visuals to show the aftermath of the incident:



What’s the Danger?

Centrifuges, which operate at high speed, have great potential for injuring users if not operated properly.

- Unbalanced centrifuge rotors can result in injury or death.
- Sample container breakage can release aerosols that are harmful if inhaled.
- 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.
    - Everyone using this type of equipment needs to know the proper operating procedures for the specific unit being operated, including how to select, load, balance and clean the rotor.
    - These procedures are explained in the unit’s operating

manual.

How to Protect Yourself

Most centrifuge accidents result from user error. To avoid injury, workers should follow the manufacturer’s operating instructions for each make and model of centrifuge that they use.

Follow these steps for the safe operation of centrifuges:

1. Ensure centrifuge bowls and tubes are dry and the spindle is clean.
2. Use matched sets of tubes, buckets and other equipment.
3. Always use safety centrifuge cups to contain potential spills and prevent aerosols.
4. Inspect tubes or containers for cracks or flaws before using them.
5. Avoid overfilling tubes or other containers (e.g., in fixed angle rotors, centrifugal force may drive the solution up the side of the tube or container wall).
6. Ensure the rotor is properly seated on the drive shaft.
7. Make sure tubes or containers are properly balanced in the rotor.
8. Only check O-rings on the rotor if you are properly trained.
9. Close the centrifuge lid during operation.
10. Do not exceed the rotor’s maximum run speed.
11. Make sure the centrifuge is operating normally before leaving the area.
12. Let the rotor come to a complete stop before opening the lid.
13. When centrifuging infectious materials, wait 10 minutes after the rotor comes to a complete stop before opening the lid.
14. If a spill occurs, use appropriate decontamination and cleanup procedures for the spilled materials. Report all accidents to your supervisor immediately.

Final Word

There are a few important guidelines for operating a centrifuge. Following them can prevent damage to the centrifuge and possible serious injury to you and others.