

Title of HWBGM Guidance Note: **Safe Use of Laboratory Microwaves**

Cross Ref. to University of Oxford Policy Statement:

Introduction

Microwave ovens are invaluable for providing rapid heating of various solutions in the laboratory and are therefore used extensively. However, they do present a variety of hazards to staff and so care must be taken when using a microwave, particularly those within the laboratories.

Responsibilities

All **Users** must ensure they are fully aware of the risks associated with working with Microwaves and understand the appropriate actions to take before they start using the equipment.

NOTE: This guideline should be read in conjunction with the equipment's 'User Guide'.

Hazards

The use of microwave ovens for simple heating or defrosting in laboratories can pose a number of hazards, including:

- Ignition of flammable vapours
- Exposure to microwave radiation from a faulty or modified unit
- Electric shock from ungrounded or faulty units
- Ignition of materials being heated
- Pressure build-up in sealed containers
- Sudden boiling of liquid in an open container following removal from an oven
- Contamination of food products with chemical residues

The direct risk of electrocution or exposure to microwave radiation is controlled by the safe construction of the oven, however care must be taken never to damage the equipment, as this may contravene the safety mechanisms. The main risk of microwave ovens arises from their misuse; as inappropriate cooking times or materials can very easily lead materials to ignite, explode or give off toxic fumes. If the equipment is used correctly and all recommended guidelines are followed, then the associated risk to the user is minimal.

Do's & Don'ts

DO NOT:

- Attempt to heat flammable liquids or solids, hazardous substances or radioactive materials in any type of microwave oven, whether domestic or laboratory-grade.
- Attempt to defeat the interlock switches that prevent a microwave oven from operating with the door open.
- Place any wires, cables, tubing etc between the door and the seal.
- Modify in any way the mechanical or electrical systems of a microwave oven.
- Use a microwave oven in a laboratory for food preparation (or vice versa)
- Heat sealed containers in a microwave oven. Even a loosened cap or lid poses a significant risk since microwave ovens can heat material so quickly that the lid can seat upward against the threads and containers can explode either in the oven or shortly after removal.
- Use bottles with a restricted neck opening [e.g. medical flats]
- Place metal objects of any kind in a microwave oven. This includes aluminium foil and plastic coated magnetic stirrer bars.
- Overheat liquids in a microwave oven. It is possible to raise water to a temperature greater than the normal boiling point; when this occurs, any disturbance to the liquid can trigger violent boiling that could result in severe burns.

DO:

- Ensure that the oven cavity is adequately ventilated. The unit should be located on a clear open bench and not in a location where the vents could be obstructed by books or equipment.

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- Conduct regular inspections to ensure that the sealing surfaces are clean and do not show any sign of damage. The presence of arcing or burn marks may be indicative of microwave leakage.
- Ensure that microwave ovens are electrically grounded and connected using a properly rated three-pin cord and plug. As with all new laboratory equipment, microwave ovens should be inspected in accordance with the University's policy for electrical equipment to ensure compliance with this requirement.
- Report defects in equipment or difficulties in operation with a microwave oven promptly to the laboratory manager or supervisor.
- Where possible use microwave grade plastic vessels with a pressure relief valve. Where glass vessels are used check these for cracks and flaws before using in the microwave.
- Use appropriate protective equipment when removing heated liquids from the oven.
- Make sure that the Electrical Safety Supervisor is aware that you have or are about to obtain a microwave oven, so that PAT testing can be carried out (Inform lab-support@well.ox.ac.uk).

Further Information

If you have any difficulties while using any of the Microwave Ovens within the HWBGM, then please contact lab-support@well.ox.ac.uk for further help & advice.