

OCDEM, Churchill Hospital, Oxford OX3 7LE

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Head of Department: Prof Fredrik Karpe  
DSO: Sandy Humphreys  
BSO: Prof Patrik Rorsman

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## The Safe Use of Naked Flames

### Microbiology or Cell/Tissue Culture

The use of a flame in microbiology to assist with sterile technique when handling bacterial cultures on the open bench has been an accepted practice for decades. The flame provides a plume of rising sterile exhaust gas (mostly CO<sub>2</sub> and steam as gas) which prevents micro-organisms from entering culture vessels when being opened and can also be used more aggressively to sterilize vessel surfaces, culture loops, and instruments when necessary.

Modern techniques now include the use of laminar flow hoods, for non-hazardous micro-organisms and the preparation of media, vessels etc, and also microbiological safety cabinets which provide protection for both the work and the worker through the use of HEPA (high efficiency particulate) filters. These, together with the availability of disposable plasticware, have rendered the use of a flame unnecessary for most purposes. It is important to understand that Class II microbiological safety cabinets provide a downdraft of sterile air which can be compromised by the presence of a flame which provides an updraft of warm gas; *therefore flames must not be used in microbiological safety cabinets.*

Wherever possible, materials and instruments should be sterilized prior to use, in a cabinet or on the bench; using disinfection, baking at 160°C, or autoclaving. Where repeat actions are required, such as dissections, multiple instruments should be pre-sterilized and opened for each separate action (dissection) rather than flaming each time.

Workers using a flame must be aware of the extreme combustibility of protective gloves which are worn when undertaking culturing techniques. It is possible to ignite a glove and be unaware for several seconds, by which time the glove has melted whilst still burning, causing extensive burn injuries to the hand.

### Notification and Storage

OCDEM laboratories do not have mains gas supply, therefore fuel gas canisters (propane and butane) are used instead.

- The Departmental Safety Officer must be notified that the Department or Group intend to use fuel gas canisters.
- All canisters must be stored in a central location within the laboratory.

- Fuel gas canisters **MUST NOT** be stored with corrosive or oxidising substances, as this can lead to corrosion of the canister and accidental leakage of the fuel. It is recommended that they should not be stored in cupboards due to the possible accumulation of flammable vapours.
- After use the canisters should be returned to the storage location and not left on benches throughout the lab.
- The location of fuel gas canisters must be noted on the fire plans for the building.
- The fire risk assessment for the building must be kept up to date.

### **Guidelines for the safe use of flames:**

- If a naked flame must be used, use a controlled flame source, such as Fireboy, wherever possible.
- If this is not possible, especially for work on the open bench, ensure individuals are fully aware of the basic safety guidelines for operating a bunsen burner:
  - **NEVER** use near open containers of flammable liquid or in environments where appreciable amounts of flammable material or vapour are present, such as fume cupboards or histology areas. Always remove stocks of flammable liquids from the fume cupboard before use.
  - Ensure the work area is tidy before using the flame. Do not use near combustible material. In particular, check above the burner to make sure that no overhanging items are present.
  - Use the correct burner, as specified by the manufacturers, for connecting to the gas canister.
  - Keep long hair tied back so that it does not fall over the face. Lab coats should be fastened. Make sure nothing else is loose, which could hang in the flame or dislodge the burner.
  - Avoid using disposable gloves near to the flame as they can be easily ignited.
  - If it is difficult to see the flame, use blinds and window covering to shade against bright sunlight. Maintain sufficient light though as to work safely.
  - Use a designated sparker to ignite the flame. Make sure this is accessible before you turn on the gas supply.
  - **NEVER** leave flames unattended. Always switch off when not in use.
  - Allow the burner to cool before handling. Ensure that the gas supply valve is off before leaving the laboratory.
- It is recommended that an area of bench is set aside for flame work.
- If sterilising items by the use of alcohol, ensure individuals are again aware of the following:
  - Place the alcohol as far away as possible from the source of flame and keep at the back of the bench.
  - Use only sufficient quantity of alcohol as is required to immerse the item.
  - Contain the alcohol in a covered, low, wide-based vessel, such as a **glass** Petri dish. This will reduce the likelihood of the vessel being knocked over and the cover can be used to extinguish any flame should the reservoir ignite.

- Keep the alcohol reservoir covered at all times except when immersing the object to be flamed.
- Do not return any item or holder to the alcohol directly from the flame even if a flame is not visible.
- Extinguish the flame and remove the alcohol immediately the flaming exercise is completed.

## **Emergency procedures**

Using the above directions should prevent any mishap, but if an accident happens please observe the following:

- If working on the open bench keep a damp cloth close by to extinguish any burning spilt alcohol.
- If the alcohol reservoir is spilt extinguish the flame immediately then mop up all the alcohol and allow any vapour to dissipate before re-commencing the protocol.
- If the reservoir is ignited replace cover. This should quickly extinguish the flame.
- If the alcohol or indeed anything else does ignite, and cannot be immediately extinguished, sound the fire alarm, evacuate and call the Fire Service to confirm that there is a fire. Departments embedded in NHS premises should dial 4444.
- If an individual receives a burn, contact a First Aider for assistance. Treat burns by:
  - Dousing the burn with cold water for at least 10mins.
  - If possible remove any watch, jewellery, tight clothing.
  - Cover the area with a CLEAN plastic covering (e.g. non-contaminated Clingfilm).
  - Assess the injury and patient condition; obtain medical assistance if required (especially if the burn is the size of a hand or is a deep 'full thickness' burn of any size).

<b>Version</b>	<b>Date</b>	<b>Reason for update</b>	<b>Updated/reviewed by :</b>	<b>Date next review due</b>
1	November 2008	New SOP	Author: Dean Cross, adapted for OCDEM by SMH	November 2011
1		Review – no changes	SMH	Nov 2013
1.1	April 2014	Updated header, plus removal of sentence covering 'pulling of glass Pasteur pipettes – this method is no longer used.	SMH	April 2016
1.2	9 June 2016	Head of Department updated	SMH	June 2018