

Ethanol fire Incident (2009)

Hazard Alert No. 48 (2009)

In a recent incident on campus a staff member plating bacterial cultures in a laminar flow cabinet inadvertently set alight a beaker of ethanol. The ethanol fire was unnoticed until the staff member tried to pick up the ethanol container, which was dropped as it was hot. The spilled flaming ethanol set fire to a rubbish bin below the cabinet.

Flaming of loops and bacterial spreaders are common techniques in a microbiological laboratory. Usually a beaker of ethanol is used together with a Bunsen burner. A spreading stick or metal loop is dipped in the ethanol and then flamed in the Bunsen burner to sterilise it. This procedure can result in the ethanol being set on fire in a number of ways.

- The implement may drip flaming ethanol back into the ethanol container if it passes over it, or ignite the vapour from the container
- A hot loop may be put into ethanol to cool it down. This can set fire to the ethanol as the auto-ignition temperature of ethanol is lower than the temperature of a red hot metal loop
- There may be an unnoticed residual flame on the implement, which will then ignite the ethanol container if it is put back in too quickly.

Ethanol burns with a very pale flame so it is easy not to notice that the ethanol container is on fire until it is touched. Implements placed into the burning ethanol may also become very hot which can cause the flaming ethanol to be spilled when the hot implement is picked up and very quickly dropped.

Some changes to procedures can eliminate or reduce the hazard from burning ethanol. Suggestions to eliminate ethanol from the process include:

- Implements should not be dipped into ethanol for cooling purposes. A number of loops should be available so that some can be set aside for cooling after being flamed while another is being used. This eliminates the requirement for ethanol in this situation
- Disposable loops and spreaders are available, eliminating the need for flaming or ethanol

- A number of reusable spreaders may be produced by bending Pasteur pipettes over a Bunsen flame. These may then be sterilised (possibly via autoclaving) for later use, eliminating the need to sterilise during the procedure.

If these options are not suitable, other administrative or procedural options may be used to reduce the risk from ethanol. These might include:

- Ensuring only the smallest amount of ethanol possible is used in the container
- Ensuring there is sufficient time and implements to do the task without rushing to dip a hot implement into ethanol
- Planning the work process so that flaming implements are well separated by distance from the ethanol reservoir, taking care to ensure they do not pass over the top of the ethanol
- If possible use a non-breakable and closable container for the ethanol reservoir so that the lid can be used to extinguish the fire if it catches alight.

If your work area currently uses a process involving dipping implements in ethanol and then flaming them, please undertake a risk assessment of this process using the suggestions above. Risk assessments should be incorporated into experimental protocols so that staff members are trained in relevant hazard controls at the same time as being trained in the procedure.