



A Safety Moment - Lessons Learned:

May 2021 - Ethanol Immolations

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What happened?

Within a few weeks apart two students experienced immolations of vessels containing ethanol (C_2H_5O) near a burning Bunsen:

1 PhD student was creating bacteria “libraries” by repeatedly dipping a designated metal colony comb in an ethanol bath and disinfecting it through live fire in a Bunsen burner placed on the work bench. The “comb” was then dipped in a 96-well bacteria library and the ethanol-fire-96-well plate was repeated all over again [pic. #1]. A few drops of ethanol dispersed from the “comb” heated up to immolation by the fire and were subsequently sprayed onto the ethanol bath, which in turn caught on fire. The student placed the immolated ethanol bath on the ground and extinguished the fire using his lab coat [pic. #2].



pic. 1



pic. 2

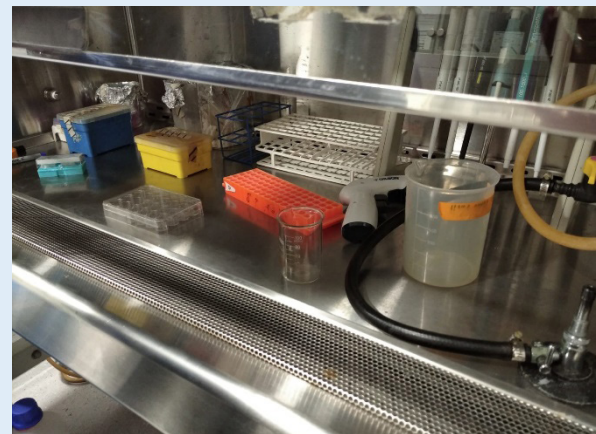
What went well?

- The student immediately closed the main Liquefied Petroleum Gas (LPG) valve of the Bunsen burner.
- The student smothered the fire using his own lab coat while the fire was still quite small.
- The main fire alarm was pressed to activate evacuation.
- A safety trustee arrived first at the scene and ensured that the fire was indeed extinguished.

What went wrong?

- Only half of the building’s residents evacuated, assuming it was a false fire alarm.
- The fire alarm could not be neutralized for several minutes after the fire has been extinguished completely because it required the use of a designated key, which was only found in the security and safety units of the Technion.

2 A PhD student, working alone at a Biological Safety Cabinet (BSC) in the lab, disinfected a round thin glass disc by dipping the disc in a small beaker containing ethanol, shaking off residual ethanol and then moving the disc through live fire [pic. #3]. The hot disc heated up the ethanol in the beaker to immolation. The student threw the immolated ethanol from the BSC on the floor and immediately left the lab towards the main security desk position at the faculty. The ethanol liquid splashed onto the lab’s PVC floor and extinguished on its own.



pic. 3

What went well?

- The building’s main LPG valve was turned off by the security unit.
- The entire building was inspected, to make sure the fire was not spread to additional locations in the building.

What went wrong?

- The student didn’t close the LPG valve of the Bunsen burner in the BSC or the lab.
- The immolated ethanol vessel was thrown away of the BSC working area onto the floor instead of smothering the small fire using a concave Pyrex glass or a glass Petri dish.
- Many cardboard boxes were stored on the lab’s floor, next to the BSC.
- The overwhelmed student alerted security claiming a blast is on its way because the LPG valve was left during the fire in the lab. In accordance, the fire department, the police and Magen David Adom arrived at the scene after being reported about an explosion in a lab.

Root cause

- Live fires too proximal to vessels containing ethanol. The ethanol eventually heats up to immolation. Drops of ethanol immolate quicker than larger volumes of ethanol, therefore procedures in which ethanol drops can be dispersed in the working vicinity cause a risk of fire drops dispersion.

Lessons Learned

- Always keep ethanol vessels far enough from operational Bunsen/burners. Try keeping the ethanol outside the route of the sterilized equipment [pic. #4- Ethanol vessel in the route], [pic. #5- Ethanol vessel outside the route]
- Make sure Pyrex/glass covers of vessels are near the working area to smother small fires upon immolation. Performing a mock run of prevalent procedures and possible failings ensures that the workflow is set up to eliminate incidents.
- The film attached/pictures below describe how to choke a small fire in a vessel:
- Lab coats used in research laboratories where there is open flame use should be made of 100% cotton. Cotton Burns less readily than polyester blends.
- All lab staff must be familiar with the locations of the lab and corridor’s fire extinguishers and LPG valves.



pic. 4



pic. 5

