

# Safety Alert

## Chemical Fire in Research Laboratory

October 2021



### Fire caused by exothermic chemical reaction

A postdoctoral researcher was adding the reactive substance boron tribromide to a chemical reaction mixture using two glass syringes. Once the substance had been added they attempted to destroy any remaining material by drawing up and discharging a saturated sodium bicarbonate solution from the syringes several times. These were left to stand for a while before being rinsed with neat methanol in a glass beaker to remove any residue. During the process it was noticed that the beaker was getting hot (most likely due to a reaction between the  $\text{BBr}_3$  and methanol) leading the researcher to pick it up at which point they noticed that the methanol had ignited and was burning with an almost invisible flame which subsequently set fire to the sleeve of the researcher's cotton lab coat. The researcher dropped the beaker on the floor next to an unprotected, plastic flammable solvent waste container before removing their lab coat and extinguishing the fire using a fire blanket. Fortunately they were not injured and the fire was extinguished before it could spread and involve the flammable solvent waste

### Recommendations

- Work involving hazardous substances should be subject to a prior risk assessment under the CoSHH Regulations. This risk assessment should include all stages of the process including purification / extraction processes, destruction of unwanted materials and cleaning processes. In this particular example the researcher had only previously worked with a more dilute form of the reagents and had not fully considered how a higher concentration could affect the safety precautions needed.
- When developing a CoSHH assessment it is important to take account of the foreseeable accidents and emergencies that may arise during the procedure. Ensuring that staff and students know how to act in the event of an emergency can reduce the likelihood of injury (e.g. in this case picking up a beaker of burning liquid led to an increased risk of injury and fire spread).
- When flammable waste is stored in the laboratory prior to disposal it should be protected from external ignition sources. Flammable waste containers should be stored in suitable fire resistant cabinets or bins when not in use.
- This incident highlights the importance of ensuring that staff and students wear PPE of the type that is appropriate for the task. When working with highly reactive chemicals where a risk of ignition has been identified, a cotton lab coat should be worn to avoid the risk of PPE melting onto skin or clothing in the event of a fire. Howie style lab coats are made of a polyester / cotton mix and offer excellent splash protection against biological materials but may not be suitable for work with certain reactive substances. The most appropriate PPE should be selected based on a suitable and sufficient risk assessment.