Mercury in projector bulbs

Data projectors are ubiquitous in classrooms and many other places around schools and colleges.

There are three main types: LED, Laser and Lamp. The oldest type, and the most likely to be found in schools are the lamp type. The bulbs in these contain mercury vapour at high temperature (when operating) and very high pressure.

While in general these are perfectly safe, as the mercury is contained within the glass, we have heard reports of the bulbs exploding and consequently releasing their contents into the room.

Before we consider any health effects, it is a good idea to look at ways in which you can reduce the likelihood of this sort of bulb failure.

There are various factors that can extend a bulb's life: avoiding overheating, keeping the fan etc dust free, not switching on and off rapidly but as far as avoiding breakage or explosion, there is one thing that is particularly important.

Make sure not to touch the bulbs with bare hands when inserting or changing them: wear gloves instead.
The bulb has an internal pressure of up to 250 atm at about 1300° Celsius and the greasy spots can lead to uneven temperature across the glass surface, internal tension, and eventual cracking or explosion.

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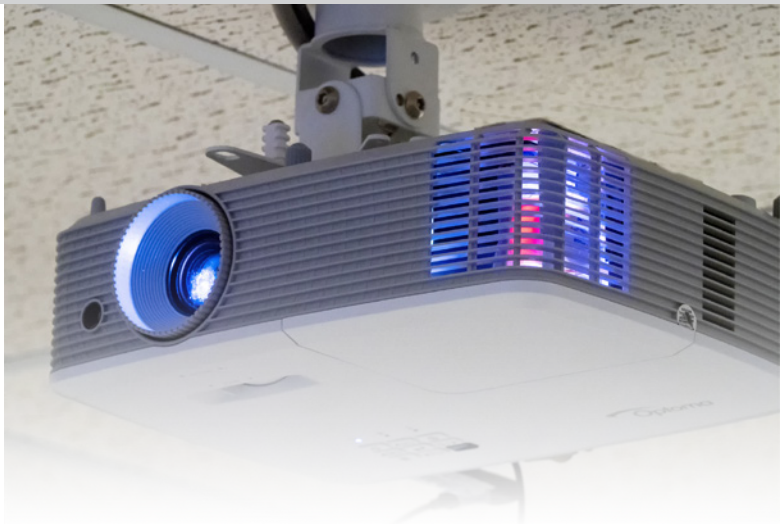

So, whether you did this or not, if your bulb explodes, what is the danger?

There is not much mercury in a bulb – around 30mg – but this is still a significant amount.

Inhalation

The main hazard comes from inhalation of mercury vapour. The workplace exposure level (WEL) for mercury vapour is extremely low (0.02 mg/m³ over 8h). Assuming all the 30 mg is vapourised and spread evenly over the lab even a large lab would produce a concentration of around 0.1 mg/m³ (though this is without allowing for ventilation).

Without measurement it is impossible to get accurate figures but some factors affecting the level could be.

Positives

- Not all the mercury vapour will escape into the room: some (maybe most) will be deposited on the glass shards and the surfaces of the projector.
- Ventilation will remove the contaminated air fairly rapidly.
- At the time of writing, face coverings are widespread in laboratories and provide some slight extra protection. It is to be hoped, though, that this situation will not last for long so the risk will be slightly higher.

Negatives

- Vapour will not be dispersed evenly so near the projector the concentration will be higher.
- It could be that the fan in the projector disperses it more or blows it in a particular direction.

Depending on the nature of the bulb, the lamp housing and the projector design, differing amounts of mercury vapour will be ejected.

In any case, in case of such an explosion the room should be evacuated to allow the ventilation to clear the vapour from the air – an hour should be plenty of time in a normal laboratory with its 5 air changes per hour.

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Skin contact

Not all the mercury vapour in the room will be removed by ventilation. A significant amount will condense onto the surfaces.

Here, if no action is taken, it can be picked up by hands and clothing.

The amount of mercury will be small so there is no need for a complete deep-clean of the room but any bench/table tops within a few metres of the projector along with stools/chairs should be wiped down with damp paper towels or tissues. These should be "double bagged" and kept for disposal as possible mercury containing waste.

It would be prudent to arrange for a good cleaning of floors and any other surfaces near the projector as well. But the highest amount of mercury condensate will be on the projector itself. The projector should be cleaned as thoroughly as possible (it will probably need to be demounted for this) and any tissues etc bagged for disposal as above.

It should be noted that this has happened and perhaps a sticker put on the outside of the projector to make sure that whenever it is being handled, people wear gloves to do so.

Some perspective

While the above might sound alarming, any level of exposure is going to be very low. It is worth remembering that we are all constantly exposed to mercury in the environment, albeit at low levels: the CDC in America suggests about 3.5 micrograms (µg) of mercury per day for an adult of average weight.

If for any reason there is reason to suspect anyone has had a larger exposure – perhaps the vapour is vented directly at an individual, symptoms of mercury poisoning include the following:

- Breathlessness
- Coughing
- A tightening or burning sensation in the chest
- Shaking tremors
- Feeling nervous and irritable

This is extremely unlikely to be an issue but if there is concern about exposure, the levels of mercury in the body can be diagnosed by a blood or urine test via the medical services. So anyone concerned should be encouraged to contact their GP. <<

SSERC Health & Safety poster

Whatever your job, your employer must tell you how to work safely. In turn, you must follow your employer's guidance. When it comes to safety in practical work in STEM subjects, your employer will expect you to follow SSERC guidance. There are a few exceptions when an employer adds additional measures over and above those specified by SSERC, but this is rare. If you are a regular Bulletin reader or have ever been on a SSERC health and safety course, you will know this.

To help get the message across to all employees working in this area, you can now download a poster from SSERC [1].

The poster reminds readers that employers expect them to follow SSERC advice and highlights how this advice can be accessed. The advice is free, save for some courses which, though they must be paid for, are subsidised. The poster could be downloaded and printed out, for display in staff bases, prep rooms or classrooms as you see fit. We hope that you will see this as an effective way of reminding colleagues of the guidance they should be following and of how to access that guidance. <<

Reference

[1] https://www.sserc.org.uk/health-safety/h_s-poster/