

Introduction

Recently we have had an increasing number of queries about high temperatures in chemical stores and, whilst not questioning the reality of global warming, it seems there is more to the matter than the merely climatic.

Although it is clear that modern schools are better insulated and thus provide warmer environments than used to be the case there would appear to be more to it than that.

Why is it happening?

Some of the most common causes have been:

- Poor ventilation
- Badly designed ventilation:
 - air being drawn out but no intake for clean replacement air
 - fans installed in the wrong position so that fresh air is immediately taken out again.
 - air being drawn in for ventilation that is already warm as it is coming from warm corridors or rooms.
- Poor positioning of chemical stores where it is:
 - often surrounded on all sides by other rooms, which are themselves heated.
 - located on the south side of the building
 - positioned near to heating pipes etc. (and even boiler rooms) too close to the chemical store.
- Windows, especially south facing, can allow heat & light in.

Why is it a problem?

Any chemicals which have a high volatility will be even more volatile as the temperature increases. Some areas of concern are:

Corrosion - Increased levels of some vapours (particularly HCl) can cause corrosion of metal. This can lead to weakening of cupboards and, perhaps more importantly, metal shelving or brackets for shelving leading to collapse.

Poor Working Conditions - Many vapours are harmful, and a few even toxic, as well as being (highly or extremely) flammable. The higher the temperature the greater the risk of exposure. These poor working conditions are of greatest concern for those who spend the greatest amount of time exposed to them, namely technicians.

Degradation - At a higher temperature, many chemicals degrade and lose their reactivity. As well as being an inconvenience, this can represent a considerable, on-going, extra cost.

References

- Building Bulletin 101: Ventilation of School Buildings (v1.4 July 2008)
<http://media.education.gov.uk/assets/files/pdf/b/building%20bulletin%20101.doc>
 School Design: Optimising the Internal Environment (Scottish Executive 2007)
<http://www.scotland.gov.uk/Resource/Doc/167966/0046205.pdf>

Fire/Explosion – Increased volatility of flammable liquids leads to an increased fire risk. In some cases, the high pressure due to increased evaporation might even lead to explosion – Ammonia is a case in point.

What should be happening?

Good practice would suggest that the temperature in a chemical store should be between 15 and 20°C. (i.e. as cool as possible without things freezing).

How to achieve a reasonable temperature?

Short Term

In the (very) short term, if it is practicable, open doors and/or windows to allow a through draught.

- **This must not compromise security.**
- Make sure the store does not vent into corridors, sub-floor, above ceiling or areas where people are working such as prep rooms or classrooms.

Longer Term

■ Black out any windows. However, any shading would have to be on the outside or the blackout achieved on the inside with an insulating sheet otherwise the effect will be to keep the room as warm or even warmer. Many chemicals are degraded by light as well as heat so this is a sensible precaution. In addition, plastic as used in storage bottles is weakened by light. (Care should be taken though not to block off any ventilation that might be happening via the windows).

- Make sure that the ventilation system is drawing air from a cool area. Another equally warm or warmer room will not help. If there is an outside wall, high and low air bricks are often enough.

Bigger decisions

It may be that the measures above do not reduce the temperature to a safe level in which case rather more drastic measures will have to be considered, including:

- Re-routing of heating ducts/pipes that are too close to the store.
- Moving the chemical store completely; preferably to a room with an outside wall.
- Installing air-conditioning – though this can not just be a substitute for ventilation or it will simply be re-circulating the fumes.

