The Association for Science Education
Promoting Excellence in Science Teaching and Learning

Accidents in School Laboratories: A Report of an Investigation

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Purpose of the Investigation

CLEAPSE recently studied approximately 800 report forms completed after accidents in the laboratories of schools in ll authorities over the period 1978 to 1980. Its purpose was to discover the most frequently occurring kinds of accidents with a view to suggesting ways of reducing them.

Although a survey based on accident forms has limitations and the results were not unexpected, confirming those of previous surveys and agreeing with what is generally believed, they are nevertheless of interest.

Frequency of Laboratory Accidents

It was not a main aim of the investigation to obtain the relative frequency of laboratory accidents compared to other school accidents but it is important to put them into a general perspective and data provided by a few authorities enabled this to be done.

Four to five per cent of pupil accidents in secondary schools occur in laboratories and the proportion of school children reported as being involved in a secondary school accident is of the order of 0.05%. Insufficient data was received to give any statistics for staff but the indications are that for them, too, the frequency of reported laboratory accidents is low.

The forms suggest that very few of the reported accidents were serious, requiring no more than a visit to hospital or a doctor with the minimum of treatment.

Analysis of the Accidents

Accidents to pupils and staff categorised

Category	Number	%
Chemicals on the body:	338	43.4
in the eyes	I77	(22.8%)
elsewhere	161	(20.6%)
Cuts	158	20.3
Burns caused by flames and hot objects; scalds	113	14.5
Dropping, falling, slipping, knocking, lifting	57	7.3

[1] The CLEAPSE Development Group is now known as CLEAPSS.

This item was originally published in *EiS* in June 1981 and was checked by the ASE Health & Safety Group in May 2016 to ensure it still offers valid advice. Although very old there hasn't been a comparable investigation on a similar scale since and there are good reasons for thinking that the overall results are broadly true even now (smaller investigations have roughly confirmed them).

Chemicals in the mouth	32	4.1
Inhalation	29	3.7
Animal bites	22	2.8
Explosions	12	1.5
Fainting	12	1.5
Electric shock	5	0.6
	778	99.9

General comments - In the analysis a large number of sub-categories were used; only the larger categories are listed here. As would be expected, a high proportion of these reported accidents occurred in chemistry lessons or other lessons involving chemicals. An attempt was made to attribute general causes such as ignorance, recklessness etc.; approximately 10% were attributable to indiscipline but it was found impossible to ascribe general causes to the rest.

First Aid—In some cases it was noticed that the treatment given to accident casualties was not the most appropriate. There were alarming accounts of what might be called in vivo titrations: for example, mouths which had been contaminated with alkali were washed out with dilute acetic acid, eyes into which acid had gone were washed with sodium carbonate solution and, in one case, skin on which acid had been spilt was tested after washing with a test paper. Most would agree that for burns and for chemicals on the body, particularly the eyes, the First Aid is water, lots of it and for at least five minutes.

Chemicals in the eyes[2]—Because the effects of chemicals in the eyes are potentially extremely serious but not immediately obvious this type of accident is clearly more assiduously reported than others. However, although some of the accidents were totally unpredictable, many were not and it is disturbing that, with eye protection now generally available, this category ranks so highly.

Few excuses for not wearing eye protection appeared on the forms; it was significant that in this respect one sub-category was exceptional. This was “heating solids”, by no means the most frequent sub-category; on two-thirds of these forms were explanations why eye protection had not been worn, of the kind “He had his goggles hanging round his neck". The realisation that eye protection should have been worn, these comments revealed, needs to be extended to other areas. Other highly-ranked sub-categories include:

splashing from over-vigorous stirring and pouring etc.;

over-vigorous reactions—spurting from test tubes etc.;

shaking test tubes, stirrers, dropping pipettes etc.;

blowouts from blocked apparatus and suck backs.

As far as can be deduced, 7% of these accidents occurred during teacher demonstrations and 17% were caused by one pupil to another; these data have implications for when eye protection should be worn. Eye protection should, however, be regarded as a second stage defence. Other precautions which can be taken include:

placing loose plugs of mineral wool in test tubes in which solids are heated;

[2] It is often not realised that alkali in the eye is much more dangerous than acid of equivalent concentration. In the event of an accident, eyelids must he held back so that the whole eye can be thoroughly flushed with water. '

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paying particular attention to apparatus in which blockages can produce increase in pressure:

care when using dropping pipettes;

the wiping of benches and taps etc. after use;

the washing of hands;

and, of course, general care while conducting chemical operations in glassware.

Chemicals elsewhere on the body—The main sub-categories were similar to those in 3.3. One addition was that covering pupils putting their hands into chemicals spilt on the benches. Food tests using Millon's and Benedicts reagents and making soap were mentioned several times and teacher demonstrations accounted for 12% of the forms.

Cuts—The highest-ranked sub-category was concerned with glassware, over a third of these involving bungs and glass tubing, thermometers etc. It is well known that the fitting of tubing through holes in bungs and its removal are hazardous; however, cuts also occurred when bungs fitted with tubes were inserted into vessels.

The only other substantial sub-category was cuts caused by scalpels.

Bums caused by flames and hot objects; scalds—Hot apparatus, mainly tripods and test tubes, caused most of these with Bunsen flames causing most of the rest.

Chemicals in the mouth—The low frequency of this category of accident would make it not worth comment were its commonest cause, mouth pipetting, not so needless. The substances concerned included oxalic acid and, in many cases, sodium hydroxide solution, sometimes strong enough to blister the mouth and lips. A pipette filler or a second burette (if necessary with a plastic tap) are possible answers.

Inhalation — It seems worth commenting that one or two teachers were unaware of the hazards of sniffing chlorine and the great variability of individual reactions to it. The effects on asthmatics and hay fever sufferers can be dramatic although unlikely to have a lasting effect.

Conclusion

The general accident record of school science teaching is good. Accidents can never be eliminated but the survey showed that more attention to a few points, notably the wearing of eye protection, could improve the record still further.

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