

Education Bureau Circular Memorandum No. 55/2010

From: Secretary for Education To: Heads of all secondary schools

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Date: 17 May 2010

Results of the Survey on School Laboratory Accidents (2008/09)

(Note: This circular memorandum should be read by all secondary school heads, teachers and laboratory technicians of the Science Education Key Learning Area.)

Summary

The purpose of this circular memorandum is to inform schools of the findings of the survey on school laboratory accidents for the 2008/09 school year.

Details

2. As one of the ways to monitor the standard of safety in secondary school science laboratories, surveys of laboratory accidents occurring at secondary schools have been conducted since the 1995/96 school year. The survey for the 2008/09 school year has been completed and its findings are summarised in the report at Annex. The report provides information on the nature and causes of common laboratory accidents in schools. It also recommends measures by which schools can take to reduce laboratory accidents to a minimum. Heads of schools are requested to bring the contents of the report to the attention of their science teachers and laboratory technicians.

3. A seminar will be conducted on 3 June 2010 to discuss the findings of the survey and measures to promote laboratory safety. Details of the seminar are posted on the Training Calendar of Education Bureau (Course ID: CDI020100336).

Enquiry

4. For enquiries, please contact the Science Education Section at 3698 3439.

Ms O L LEE
for Secretary for Education

c.c. Heads of Sections / Government Primary Schools – for information

**Report of the Survey on Laboratory Accidents
in Secondary Schools for the 2008/09 school year**

I. Background

As one of the ways to monitor the standard of safety in secondary school science laboratories, surveys of laboratory accidents occurring in secondary schools have been conducted since the 1995/96 school year. From the 2002/03 school year onwards, the survey has been conducted on a triennial basis. The information obtained is disseminated to all secondary schools to provide updated information on common laboratory accidents, so that schools can take appropriate preventive measures. This report presents findings of the survey for the 2008/09 school year.

II. Results and Observations

2. A total of 459 schools responded to the survey for the 2008/09 school year, in which 303 (66%) reported that there were no laboratory accident cases. A total number of 502 accident cases was reported, while 419 students and 8 staff were injured. When compared with the survey for the 2005/06 school year, the total number of accident cases, the number of cases per school, and the total number injured decreased by 9%, 8% and 16% respectively. Most of the injuries were minor ones. The majority of the cases were due to carelessness of students. Detailed statistics of the survey is shown in the **Appendix**.

3. Heat burns or scalds and cuts were the most common laboratory accidents accounting for about 74% of the cases reported. A breakdown of the number of cases in different types of reported accidents is listed in the **Appendix**. The nature of each type of accident is summarised below:

- (a) **Cuts:** Most cases involved small cuts caused by broken glass apparatus (e.g. test tubes, glass tubing), tools (e.g. dissection instruments, cutters) or sharp edges. In some cases, when students fitted pipette into pipette filler or glass tube into rubber stopper, the glassware broke and hurt the students. Injuries were mostly found on fingers and palms.
- (b) **Heat burns or scalds:** They were mainly caused by carelessness in handling hot objects (e.g. tripods, Bunsen burners, metal rods, glassware or combustion spoons), hot liquids,

Bunsen flame or lighted matches. About 65% of the cases under this category occurred in junior secondary science lessons. Slight heat burns on hands were most common.

- (c) **Chemicals on skin:** Many cases involved spillage of chemicals during transfer or heating of chemical liquids. Concentrated sulphuric acid, phenol and dilute acids were the most common chemicals involved. Slight burns or irritations were resulted.
- (d) **Eye accidents:** In most cases, liquid chemicals splashed onto the eyes, giving rise to slight irritation or discomfort. The chemicals commonly involved were copper(II) sulphate solution, dilute acids and alcohol. Among the cases, a student rubbed his eyes with hands contaminated with chemicals, while another one did not wear safety goggles properly resulting in splashing of sodium acetate solution onto the eyes. Another student who wore contact lenses felt uncomfortable in the eyes when an irritating gas vapourised. In another case, one of the eyes of a laboratory attendant was injured by dilute hydrochloric acid when cleaning the laboratory.
- (e) **Chemical spillage:** In most cases, small-scale spillage of chemicals was involved. In a few cases, the quickfit apparatus were either not joined properly or not heated evenly. In another case, a laboratory technician mistakenly poured concentrated acid into the container for organic waste. In these cases, chemicals splashed out.
- (f) **Substances catching fire:** Most of the cases were caused by accidental ignition of flammable liquids (e.g. alcohol). In one case, a student used the same pipette for transferring two different catalysts in the preparation of polystyrene, resulting in a small fire.
- (g) **Discomfort arising from inhalation of gases:** In one case, acidic gases were given out when the student washed test tubes in the sink, resulting in discomfort in the throat.
- (h) **Bites by animals:** Only one case was reported, in which the laboratory technician was bitten by a rat and received treatment in a clinic.
- (i) **Others:** All reported cases under this category were very minor ones. For instance, a student drank filtered water in the laboratory. In another case, a student was stung by a bee.

4. Information on the usage of science laboratories in schools was also collected in this survey and the following accident rates were computed:

(a) **Accident rate per 1,000 students:** The schools reported that in the 2008/09 school year, there were 502 accidents cases and a total of 336,787 students (S1-7) studied science courses. This corresponded to an accident rate of 1.49 cases per 1,000 students studying science courses.

(b) **Accident rate per 10,000 practical periods:** The schools reported that in the 2008/09 school year, a total of 1,294,996 periods were conducted with science practical activities e.g. student experiments, teacher demonstrations, preparation for experiments, project work and science club activities. This corresponded to an accident rate of 3.88 cases per 10,000 practical periods.

III. Recommendations

5. Although accidents resulting in serious injuries rarely occur in school science laboratories, schools should continue to be on the alert and take active measures to reduce laboratory accidents to a minimum.

(a) Enhancing Safety Awareness of Laboratory Users

Different resources have been developed to enhance the safety awareness of laboratory users. Teachers and laboratory technicians may refer to the handbook “*Safety in Science Laboratories*” (http://cd1.edb.hkedcity.net/cd/science/laboratory/safety/SHB_2002e.pdf) for related information. A set of designed new laboratory safety symbols has been produced in the 2009/10 school year for schools to download (<http://edblog.hkedcity.net/nsschem>). New safety equipment such as protective gloves has been included in the “*List of Furniture and Equipment*” for the New Senior Secondary (NSS) Science curricula (<http://www.edb.gov.hk/index.aspx?nodeID=5535&langno=1>). Teachers, laboratory technicians and students could use these resources to prepare or conduct experiments safely. Besides, the following learning packages are available at the EDB website to facilitate teachers in planning and conducting lessons on laboratory safety:

- Learning and Teaching Resources on Safety in Science Laboratories
(http://cd1.edb.hkedcity.net/cd/science/laboratory/SAFETY/safety_exemplars_e.pdf)
- Safety in Exploring Science
(<http://resources.edb.gov.hk/~ses>)

(b) Risk Assessment

In the NSS Science curriculum, students are encouraged to conduct more inquiry-based experiments and scientific investigations. Risk assessment before practical activities is especially important to ensure safety in the laboratory. Teachers, laboratory technicians and also students should be able to recognise potential hazards, assess risks associated and take corresponding control measures and precautions to control the risks. Schools may refer to safety information about chemicals from material safety data sheets (MSDS) and other information to conduct a proper risk assessment.

(http://cd1.edb.hkedcity.net/cd/science/laboratory/safety/msds_ss_2000.pdf)

(c) Laboratory Management

Some accidents were due to improper disposal of chemical waste in the laboratory. For proper handling of chemical waste, schools are strongly recommended to follow *the Guide on the Segregation, Packaging, Labelling and Storage of Laboratory Chemical Wastes for Schools* prepared by Environmental Protection Department, which is available at http://cd1.edb.hkedcity.net/cd/science/laboratory/waste/cw_e.htm. It is also important for schools to inspect the laboratory regularly to spot any irregularities so that immediate action can be taken. The Laboratory Safety Inspection Checklist is available at

http://cd1.edb.hkedcity.net/cd/science/laboratory/content_safety.html.

(d) Standing Committee on Laboratory Safety

Safety is everyone's responsibility. We need a constant and concerted effort to maintain the standard of laboratory safety in schools. In order to establish and maintain an effective safety management system, all secondary schools are advised to set up a standing committee on laboratory safety (SCLS) to better equip schools with capacity to deal with emergency situations. It is also important for the SCLS (and other safety management committees) of schools to meet regularly so that the members could coordinate and monitor the safety measures more closely, and review the laboratory management practices more systematically.

IV. Concluding Remarks

6. The statistics of the survey revealed that the schools have not only maintained a high standard of laboratory safety, but also shown improvements in it. Nevertheless, schools should continue to take a proactive role in monitoring the standard of laboratory safety in their schools. Based upon the fact that over 96% of accident cases were due to carelessness of students, students' attitudes towards and knowledge of safe practices in laboratories should be enhanced. Laboratory safety should be emphasised for each and every practical activity. Risk assessments should be made in advance and suitable personal

protective equipment should be worn when conducting experiments. For more guidelines and resource materials on laboratory safety, please refer to the website of Science Education – Laboratory Safety and Management at the following website:
<http://www.edb.gov.hk/index.aspx?nodeID=3376&langno=1>.

Science Education Section
Education Bureau
May 2010

**Statistics of the Survey on Laboratory Accidents
in Secondary Schools for the 2008/09 school year**

Summary of Survey Results

Number of schools responded	459
Number (percentage) of schools reported laboratory accidents	156 (34%)
Number of accident cases	502
Number of accident cases per school	1.09
Number of students injured*	419
Total no. of injured staff*	8
Accident rate per 1,000 students studying science courses**	1.49
Accident rate per 10,000 practical periods	3.88

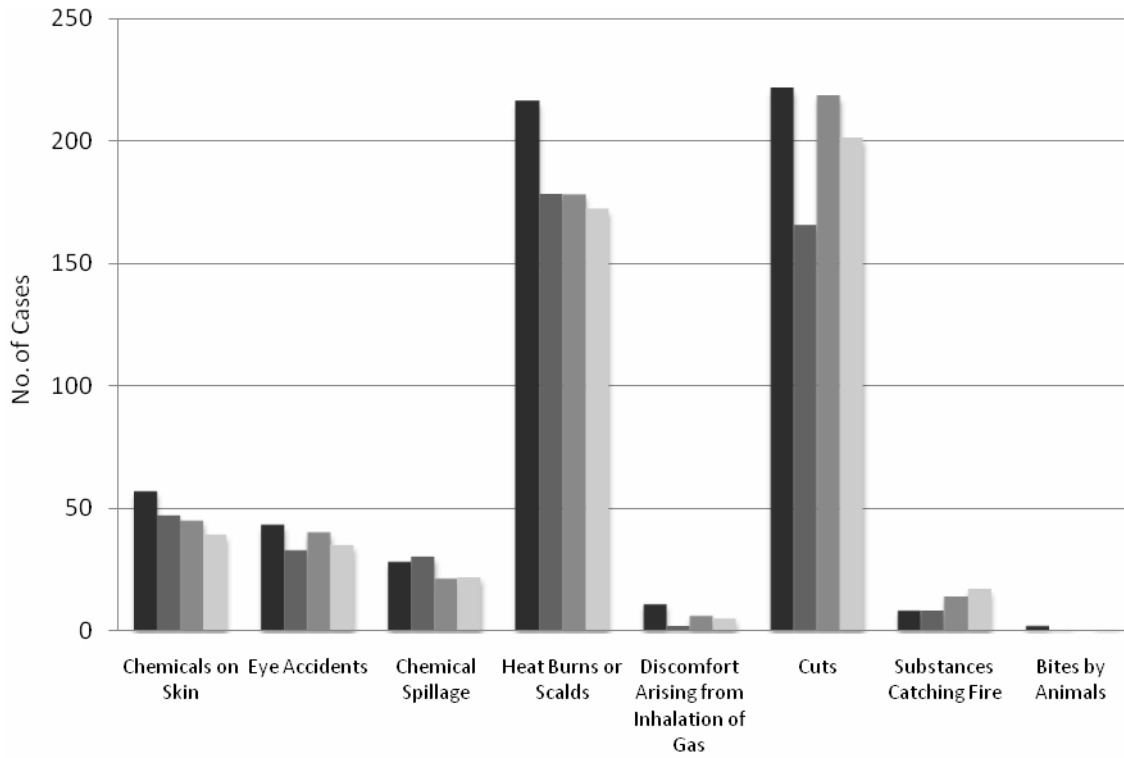
**Most of the injuries were very minor ones, e.g. minor cuts or scalds on hands.*

***In 2008, the traffic accident rate in Hong Kong was 2.1 cases per 1,000 population; the industrial accident rate in all industries was 27.2 cases per 1,000 workers.*

Type of accident	Number of cases	Percentage
Cuts	201	40.0
Heat burns or scalds	172	34.3
Chemicals on skin	39	7.77
Eye accidents	35	6.97
Chemicals spillage	22	4.38
Substances catching fire	17	3.39
Discomfort arising from inhalation of gases	5	1.00
Bites by animals	1	0.20
Others with personal injury	10	1.99
Total	502	

Subject	Number of cases	Percentage
Science (S1-3)	257	51.2
Chemistry	150	29.9
Biology	75	14.9
Physics	19	3.8
Science & Technology	1	0.2
Total	502	

**Surveys on Laboratory Accidents in Secondary Schools
1999/2000 – 2008/2009 School Years**



■ 1999/2000	■ 2002/2003	■ 2005/2006	■ 2008/2009
586 cases	464 cases	522 cases	502 cases
(448 schools responded)	(422 schools responded)	(464 schools responded)	(459 schools responded)