You Have Safety Questions? We Have Safety Answers!

« « « By the STAO Safety Committee

The STAO Safety Committee welcomes enquiries, with respect to safety issues, from STAO members. Please send your questions to the Safety Committee Chair (refer to page 4 'Committee Chairs'). Your questions and the STAO Safety Committee responses may be published in Crucible, particularly if the information is deemed of general interest to other STAO members. Anonymity, however, will be guaranteed.

QUESTION # 16: What are the safety issues regarding the use of diluted iodine in the science laboratory? Do you have any specific recommendations or do you know where I can find additional safety information other than that which is found in *Be Safe!*?

RESPONSE: Solutions of iodine can either be aqueous or alcoholic. The latter obviously are highly flammable

and should not be used near an open flame. The aqueous solutions normally used in school science (e.g. testing for starch) are sufficiently diluted (i.e. > 0.1 mol/L) so as not to impose any hazard. Iodine vapour and solid iodine, however can be hazardous. The following information is extracted from the STAO publication *Laboratory Recipes*, available from the STAO Science Store.

Hazards:

Vapour is HARMFUL to the respiratory system. Vapour and solid iodine IRRITATE the eyes. Solid burns the skin. Prolonged exposure to low concentrations of vapour or contact with skin or eyes is dangerous.

Control Measures:

Wear eye protection and gloves when weighing solid iodine. Ensure the science laboratory is well ventilated.

Other Comments and Notes:

Iodine is only sparingly soluble in water and it is usual to dissolve it in aqueous potassium iodide or organic solvents such as ethanol.

A 0.01 mol/L iodine solution is suitable for testing for starch.

** 'Tincture of Iodine' solution can be prepared by dissolving 2.5 g of potassium iodide and 2.5 g of iodine in 100 mL of ethanol. Label this solution FLAMMABLE.*

QUESTION#17: I recently received a message from my health and safety committee that identified a concern regarding a shock hazard with some secondary science equipment. This relates to the older gas spectrum tube transformers that do not have an on/off switch. It is quite easy for a teacher to place a faulty tube in the transformer, become distracted and overlook unplugging the transformer before removing the tube. This could result in several thousand volts. I wondered if your committee had any experience with this equipment and any recommendations.

RESPONSE: The shock hazard exists with old type spectrum tube power supplies, which have open electrodes to insert the spectrum tube. The power supplies now provided by scientific supply companies are completely enclosed, and you cannot get a shock unless you intentionally squeeze your finger where the tube should be put. They also have an on-off switch. Discard the old ones and replace. Do not put a switch on. They would still be hazardous, as the lead to the top electrode is a bare metal rod.

QUESTION#18: I'm trying to find information regarding the safe use/setup of acid baths to clean/neutralize glassware etc., used from experiments. Any assistance would be appreciated.

RESPONSE: Because of their extremely hazardous nature, STAO does not recommend the use of acid baths such as chromic acid (dichromate/sulfuric acid mixture) for cleaning glassware. Laboratory-grade detergents should always be used. It is best to clean glassware immediately after use, as the longer glassware sits the harder it is to clean.

QUESTION#19: We seem to have some confusion here at the Board regarding the requirements for science teachers and WHMIS. We thought they need to be trained, but OH&S seems to think a general awareness is all that is required. We have inconsistency from legacy Boards where some required training, had to write the test, and received a certificate of completion. Others simply had to attend an information-type meeting about WHMIS. Any idea what the regulations require? Does STAO have a recommendation?

RESPONSE: The employer must provide education and training, related to hazards and associated safe work procedures, for those either working with or in the proximity of hazardous materials. [*Occupational Health and Safety Act* Section 22g(1)]

In addition, the employer is obligated to consult the joint health and safety committee with respect the content and delivery of the education program. [*Occupational Health and Safety Act* Section 2g (2)]

The worker education program must cover the following six areas. [*WHMIS Regulation* Section 7(1)]

1. Labels – the information required, the purpose of the information and the significance of the information;
2. Modes of identification when used at the workplace instead of labels;
3. MSDSs – the information required, the purpose of the information and the significance of the information;
4. Procedures for the safe use, storage, handling and disposal of a controlled product;
5. Procedures to be followed where fugitive emissions are present; and
6. Procedures to be followed in case of an emergency involving a controlled product.

The education program does not have to include instruction on every controlled product in the workplace. Under the WHMIS Regulation, so-called "generic instruction" is permitted. Science teachers, for example, may be trained on groups or families of chemicals with similar properties (e.g., each of the 6 classes of controlled products as classified by WHMIS). The success of the training program would be judged by whether or not the science teacher could work safely with any chemical he/she was asked to use and his/her ability to address storage requirements and disposal of the chemical. Generic instruction is acceptable in the following cases:

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Calcium Hydroxide Solution

Formula: $Ca(OH)_2$

Molar mass: 74.09 g/mol

- Grey/white solid (powder)

Hazards

Calcium hydroxide solution (lime water) is not officially classed as hazardous, but any splashed in the eye may cause severe irritation.

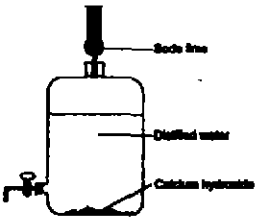
Control Measures

Wear eye protection when using lime water, especially if blowing into it.

Solution Preparation

- Add 6 g (approx.) of calcium hydroxide to a 2.5 L bottle and half-fill it with water.
- Stopper and shake the bottle.
- Fill the bottle with water, stopper and shake again.
- Leave the bottle overnight for the suspension of undissolved calcium hydroxide to settle.
- Decant the clear lime water solution into smaller containers, when required for use.
- Add more water and/or calcium hydroxide when the level of the solution becomes low.

- If a large volume of lime water is required then add an excess of calcium hydroxide to an aspirator bottle with spigot, protected by a soda lime tube as shown, and top up the water as necessary



Other Comments and Notes:

Saturated calcium hydroxide solution is commonly called lime water. The solution does not keep for long periods of time as it reacts slowly with carbon dioxide from the atmosphere. Dilute hydrochloric acid can be used to clean bottles that previously contained lime water.

Laboratory Recipe Sheet

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- instruction in the content required on supplier labels, workplace labels and material safety data sheets;
- instruction in how WHMIS works;
- instruction in the hazards of a group of products which have similar properties and for which it is acceptable to use a generic material safety data sheet, provided there is instruction in hazards peculiar to anyone product in the group;
- instruction in work procedures for a group of products if the procedures are basically the same for all the products in the group.

After a worker has completed the education program the employer is expected to try and ensure that the worker has understood the training material, and is able to put into practice what he/she has learned [*WHMIS Regulation* Section 7(3)]. It is left to the individual employer to devise the means to ascertain that a worker has been properly trained. For example, the employer may ask the worker to take some form of written or oral test, or to participate in a practical demonstration.