Reflection on Classroom Safety and Management

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I think the ester hydrolysis prac would be a terrifying prac to try and supervise, I’ll attempt to list hazards I identified and methods I would use in an attempt to manage them in the table below, but honestly… i think I might start out trying simpler, safer pracs and work my way up to something like this. The realities of being responsible for a class full of children not hurting themselves is… intimidating.

The majority of my proposed management strategies fall under ``Administrative Controls’’ in the Hierarchy of Control, not sure if that is a problem or to be expected. It might also be a result of having been given a prac to analyse, rather than designing a prac from scratch --- in the latter case I could for example control certain variables by changing the prac design and removing them entirely, etc. I like ester hydrolysis as an alternative to ester synthesis for example, as sodium hydroxide is much safer than sulfuric acid. The main focuses of my management strategies seem to have two main focuses:

* Establishing routines, introducing students to each component of a complex prac one at a time and training them with the equipment (and relevant safety protocols), and
* Managing the space in such a way to make it realistic to check all the important things. This would include: centralising particularly hazardous chemicals so that aliquoting could be more easily supervised, and restricting the amount available to each student and hence the danger, and also introducing protocols such as “I need to sign off on your set-up before you turn the gas on”, to ensure safe set ups.

The scary reality is I can’t be looking everywhere at once, so ultimately there needs to be some amount of autonomy and trust in the students taking responsibility for their safety. Although all these steps and routines should help, at the end of the day I won’t be looking at every student at every moment, so training them to understand how to operate safely and how to react in the event of a spill, etc. seems really crucial to me.

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| **Hazard** | **Description** | **Management** |
| Glassware | Can break, especially if dropped. Broken glass can cause lacerations. | I would introduce students to the glassware through more straightforward pracs initially so that by the time they get to a more involved prac like this one, they are familiar with the equipment and procedures. During the earlier pracs I’ll be able to focus more on supervision while they are familiarising themselves in the simpler pracs as there are less other hazards to split my attention.  I’d ensure every student knows the procedure for handling broken glass: do not use your hands, use a dustpan and broom to sweep up the broken glass. Maybe even practicing this at some point.  I would establish a routine in the lab that the students are not allowed to start their prac until I’ve checked and OK’d their glassware setup --- incorrect setup could result in all sorts of hazards. I would also try to minimise other hazards, like traffic below, that could cause broken glassware in the first place. |
| Traffic | The benches back against each other so if a student is working at their bench and they step backwards they will likely bump into the student behind them, if they are carrying chemicals or handling glassware this could result in injuries.  Similarly, at points in the procedure when all the students will need to collect something from the fume cupboard there would be traffic congestion, with similar hazards. | Early in the year I would establish routines and protocols surrounding behaviour in the lab --- one key aspect of which would be to never step backwards without looking behind you first. By the time they get to this prac this should be fairly ingrained in the students.  Similarly, I would establish routines to avoid bustling. Either with a orderly que system, or a system where I would call on individual groups one at a time to come collect their reagents, or where each group would nominate a single student to go to the fume cupboard, minimising congestion. |
| Heat | Bunsen burners produce open flames, and heating mantles get hot without seeming to be hot (like an electric stove). This can cause burns, or start fires. | I would ensure I am familiar with where the emergency stop (gas off, electricity off) button is, and I would establish a routine if possible where I would stand near it while supervising.   I would ensure the students are familiar with the procedure for fire: don’t try to put it out, back away (looking behind you) and let it burn out on it’s own or let the supervisors handle it.  One of the criteria for glassware setup would be the ensure that anything that could be damaged by fire is out of the way of the flames, such as condenser tubing and very importantly the gas tubing, and anything flammable, including reagents (such as methanol). |
| Electrocution | Heating mantels are electrical and if exposed to water (like from a condenser tube slipping off) or if their electrical cable is exposed (like by the plastic coating being melted off) they could be an electrocution hazard. | During the check of the setup, condenser tubing being securely fastened and kept away from any heating elements would be checked before the water is turned on, and procedures for safe disassembly would be put in place.   I would ensure students are aware of the procedure for electrical hazards: stay away, don’t try to move anything or ``fix it’’, wait for the electricity to be turned off using the emergency stop override. |
| Hazardous Chemicals | Methyl salicylate, sodium hydroxide, methanol, salicylic acid, hydrochloric acid, and potassium dichromate are all hazardous.   All these can cause skin irritation, serious eye irritation, and are harmful if swallowed or inhaled.  Methanol is flammable (not on the risk assessment?!).  Sodium hydroxide, hydrochloric acid, and potassium dichromate can cause burns (are corrosive)  Potassium Dichromate can cause cancer. | Personal Protective Equipment (PPE) would be used in the lab, including closed toe shoes, lab coats, safety glasses and gloves.   Potassium dichromate would be controlled by distributing in small controlled amounts (dripper bottles) and with instructions to only use one drop, with care.  Sodium hydroxide and hydrochloric acid would only be distributed in small amounts and collected from a single location (fume cupboard), under direct supervision. Centralising their location would make supervision easier.  To control for methanols flammability, the outside of glassware would be checked to make sure it is dry before applying any heat, and if not dry dried with paper towel before continuing.  I would also ensure students were aware of procedures if spills did occur --- stay away, let the supervisor/ teacher (me or lab tech) do the clean up. If a spill resulted in any chemicals getting on a student immediately rinse with running, cold, water. Eye wash and shower would be available and clearly signed in case of eye exposure or larger spills. |