



The University of Hong Kong

# SAFETY MATTERS

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## Chemical safety – Storage of unstable chemicals such as Ammonium persulfate

An incident was reported recently in the University where an explosion of an amber Winchester bottle containing 0.2 mol/L ammonium persulfate solution occurred in a laboratory. Pieces of glass debris were found 2-3 meters away from the storage location of the container. Fortunately no one was in the nearby area thus no one was injured by flying glass debris. Before the incident the bottle was full of ammonium persulfate and was placed on a bench. No one was using the solution or moved the bottle, which suddenly disintegrated spontaneously. It is possible that the chemical decomposed gradually at room temperature releasing gas over time. The gas accumulated and built up pressure inside the container after several months of storage. Since the bottle was full, there was limited headspace available which accelerated the over pressurization process leading to the explosion.

The use of unstable chemicals is very common in the University. Groups of chemicals such as peroxides, perchlorates have high oxidizing ability and are relatively unstable. Ammonium persulphate is used in the preparation of polyacrylamide gels. Proper storage practices are crucial to consider when handling similar chemicals for teaching and research purposes. The following are some suggestions for consideration:

1. Plastic containers are more preferable than glass containers to store solution form of chemicals with oxidizing properties if they are chemically compatible with the contents. If excessive pressure is built up inside the container, the plastic bottle will simply deform and split; thus the consequences of over pressurization are less severe.
2. Some oxidizing chemicals may be less stable than their solid forms when they are prepared in solution form even if the concentration is low. Preparing the solution freshly prior to use is recommended. Surplus amount of solution should be discarded as soon as possible.
3. If it is necessary to retain solutions of unstable chemicals for a period of time, storing in refrigerator is suggested and date of preparation should be marked on the container.
4. Enough headspace should be reserved in the container when storing the solution. Occasionally opening the cap to release potential pressure accumulated inside the container also serves as a good practice.
5. Avoid storing oxidizing agents with organic materials and reducing agents. Before reusing the container, ensure it is thoroughly cleaned to prevent the oxidizing agent from coming into contact with incompatible impurities.
6. Avoid exposure to heat and light that can promote the decomposition of unstable chemicals.

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Director of Safety



The photo on the left-hand side shows the Winchester bottle after the incident. Note that more than half of the bottle has disintegrated to produce glass projectiles. The next photo illustrates some small glass debris from the broken container found on the shelf near the bench where the bottle was stored. The last photo indicates glass debris embedded in the false ceiling.

(Accident investigation, research and bulletin preparation by Dr. Connie Ng, Senior Safety Officer)