



## Explosions in lead/acid batteries

Some schools use commercial kits to show the properties of lead/ acid batteries in work on energy conversion. Typically, sulphuric acid is put into a beaker-like container. A plastic disc rests on top of the beaker, with the lead electrodes fastened to the disc by the terminals, which protrude through it. There is a small hole to vent hydrogen and oxygen gases.

We have heard of several explosions when using these kits. One possible cause is that the plates have worked loose and thus been able to move close to each other, producing a spark as they are about to touch. Another possibility is that a spark is produced as a wire is being connected to or disconnected from the terminal. Either way, the spark ignites the mixture of hydrogen and oxygen above the acid. The risk of such explosions is well-known in the motor trade, with lead/acid car batteries.

If the gaseous mixture could diffuse away more quickly, an explosion would be much less likely. Some schools make their own apparatus, simply using lead foil at either side of an open beaker. An explosive mixture of gases could not build up in this situation, although if pupils get too close there might be some small risk of exposure to sulphuric acid spray as bubbles burst. Most of the commercial kits seem to have very small holes, typically 2 mm diameter. This prevents the spray problem, but may not be allowing the hydrogen to diffuse away quickly enough. Drilling a rather larger hole should solve the problem. If the lead/acid battery is used in a teacher demonstration, or as one activity in a circus, it would be sensible to protect participants by use of an explosion screen.