Breaking bad bottles

We have had a few reports recently concerning the structural failure of plastic bottles. While this can often be a mere annoyance, the bottles in question have been ones containing concentrated acids.

In one case a bottle of concentrated sulfuric acid was picked up by the moulded handle which promptly broke off. In another, a bottle of nitric acid was picked up by the neck and it broke there. There have been similar reports from our colleagues in England as well.

As far as we can ascertain, these are the original bottles the chemicals came in from the suppliers. They are also usually a few years old, 4 to 6 or so. We should add here that the reports concern bottles from a variety of suppliers.

Having looked into the subject, it seems that plastics of various sorts are prone to embrittlement, albeit at a slow rate, usually as a result of the plasticiser leaching out into whichever solution is being kept in them. This process can be accelerated by various factors, depending on the particular plastic involved. These include heat, uv light and oxidising agents.

Figure 1 *- A nitric acid bottle showing severe cracking.*

This is still an uncommon problem but we would recommend that if you are handling a plastic bottle of concentrated acid you inspect it beforehand and handle it carefully. In the longer term, if you find you have bottles of, for instance, concentrated nitric acid, that tend to sit around for several years, it might be an idea to see if it is possible to purchase in smaller quantities (1 litre rather than 2.5 litres for example) to make sure that the bottles are not sitting in your chemical store for too many years.