Citric acid

When carrying out any quantitative work in chemistry, it is important to know the concentration of any solutions you use. Too great a concentration and some reactions will become dangerous, too low a concentration and some reactions will not work.

An eagle-eyed SSERC member has spotted that different containers of citric acid which her school has bought recently from the same supplier have different hazard symbols on them and is, understandably, a bit confused.

The issue is that we are in the middle of the process of switching from CHIP to GHS registration. All chemical manufacturers have to submit their classifications of chemicals to ECHA (the European Chemicals Agency) and ECHA will eventually come up with an agreed standard classification for the EU.

Unfortunately, manufacturers don't have to register chemicals until June 2018 and there will then be more delays before all substances have a harmonised classification. It's not quite as bad as it sounds. About 2 thirds of the chemicals on our database have a harmonised classification already but citric acid is not one of them.

As for citric acid itself, we have looked at the ECHA database, where the manufacturers register their proposed classifications. Of the 650 registrations, 490 rate it as a Cat 2 Irritant (skin or eye), 107 as having no hazard at all and only 65 as Cat 1 Eye Damage (which rates a Danger signal word and a corrosive symbol).

Whenever a supplier gets a batch of a chemical, such as citric acid, they pass on the assessment of the hazard given to them by their supplier. Unfortunately, different manufacturers classify it differently - hence the different labels on different tubs. The assessment of irritant/ corrosive is not an exact science and we suspect that citric acid is relatively close to the dividing line, hence the different classifications.

On a related topic, the same contributor looked at the manufacturer's Safety Data Sheet (MSDS) and was a little alarmed to see that although it gave no hazard, it said that gloves should be worn to handle it.

These data sheets need to be read with an educated eye. The safety information on the MSDS is drawn up considering industrial processes, using large quantities for long periods of time. This can lead to advice that might seem rather over the top for the sort of small-scale laboratory use that is the norm in schools. For instance, here is some information from a MSDS.

Personal protection
- Splash goggles.
- Lab coat.
- Dust respirator.
- Be sure to use an approved/certified respirator or equivalent.
- Gloves.

Personal protection in case of a large spill
- Splash goggles.
- Full suit.
- Dust respirator.
- Boots.
- Gloves.
- A self contained breathing apparatus should be used to avoid inhalation of the product.
- Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

The chemical involved? Sodium chloride - salt!

The precautions taken when handling a chemical should be determined by a risk assessment that uses the best available advice. We would suggest, not surprisingly perhaps, that the advice of SSERC trumps the 'raw' MSDS as ours is drawn up considering the sorts of uses and exposure encountered in schools.

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