



Water safety: adding phosphate reduces both lead and copper

Phosphate is added to domestic drinking water to reduce lead levels in the UK, to help meet EU Drinking Water Directive standards. New research has now found that phosphate can also reduce the amount of copper in domestic sewage by more than a third. This method could help Member States meet forthcoming “safe” levels for water discharged to the environment, under forthcoming EU Water Framework Directive (WFD) proposals.

Old lead piping is a major source of lead contamination in drinking water and has been linked to reduced cognitive development in children and an increased risk of heart disease. Similarly, copper piping can contaminate domestic water through prolonged exposure. However, concerns about copper are not related to human health, but to copper discharged in sewage. Unlike some organic pollutants, copper (and other heavy metals) is not broken down easily in the environment and can accumulate in organisms, leading to toxic effects.

Adding phosphate to domestic water makes it harder for lead compounds in pipes to dissolve and has been used to reduce lead contamination since the 1980s. To meet EU Drinking Water Directive¹ standards, water companies in the UK must use enough phosphate to keep lead concentrations below 25 microgrammes per litre, although this threshold is only an “interim target” in the Directive. The UK will need to meet the final target value of 10 microgrammes per litre by 2013.

The scientists collected data on water treated with phosphate from a number of domestic water companies in England between 2000 and 2006. They looked at the copper concentration of the water as it entered households as drinking water and again as it left as sewage effluent.

Experiments in the laboratory have shown that phosphate may also reduce the solubility of copper, but until now this had not been tested within a realistic environment. For example, work by other scientists has suggested that the chlorine in domestic water (added as a disinfectant) may actually increase copper solubility.

The results of this study found that, on average, copper in drinking water was reduced by around 45 per cent in treated water compared to untreated water (from 65 to 36 microgrammes per litre) and that this result was consistent across different water types (soft, moderately hard and hard water).

Importantly, the scientists also found that, on average, the copper content of sewage was approximately 30 per cent lower in water treated with phosphate than in untreated water (decreased from 15 to 10 microgrammes per litre).

Significantly, the reduced copper in domestic sewage effluent to 10 micrograms per litre is in line with “safe levels for copper in freshwater and marine waters”, as determined by an EC investigation completed in 2008 and endorsed by the Scientific Committee on Health and Environmental Risks (SCHER). These limits are expected to be the basis of forthcoming recommendations for copper in the environment under the EU Water Framework Directive (WFD)².

From their findings, the scientists therefore suggest that the controlled treatment of domestic water with phosphate is likely to play an important part in meeting forthcoming water quality standards for both lead and copper contamination.

1. See: http://ec.europa.eu/environment/water/water-drink/index_en.html
2. See: http://ec.europa.eu/environment/water/water-framework/index_en.html

Source: Comber, S., Cassé, F., Brown, B. *et al.* (2011). Phosphate treatment to reduce plumbosolvency of drinking water also reduces discharges of copper into environmental surface waters. *Water and Environment Journal*. 25; 266-270.

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