

WATER UK BRIEFING NOTE



ALUMINIUM IN DRINKING WATER

SUMMARY

- **UK water suppliers place the highest priority on assuring the quality of water provided to their customers.**
- **Aluminium is a significant element in the earth's crust and is therefore widespread in the natural environment. Aluminium based salts are also important chemicals used to ensure safe and effective treatment of some surface water, particularly as a barrier against pathogenic microorganisms.**
- **WHO support such use of aluminium salts in water treatment which it recognises as an important process for protecting public health**
- **In the UK, the water quality regulations set a mandatory limit for aluminium in drinking water. The current EU Drinking Water Directive sets only an indicator value for aluminium in water.**
- **WHO has not set a formal guideline value for aluminium in drinking water but has indicated that under good operating conditions an average value of 0.1 mg/litre or less should be achievable in large water treatment facilities but where there are practical difficulties in smaller treatment facilities 0.2 mg/litre or less is a practical target for finished water. These values are consistent with UK practice.**
- **Water UK fully endorses the WHO advice and believes that the current EU guideline value for aluminium in drinking water takes a precautionary approach, in view of the uncertainties over aluminium and health, and provides an operational benchmark to prevent discolouration problems whilst permitting the continued use of an important treatment chemical**

TECHNICAL BACKGROUND

Where does aluminium come from?

Aluminium is one of the most abundant natural elements on earth and it occurs widely in the environment, including raw water sources. Aluminium and its compounds have many uses, from aluminium foil and cooking utensils to over the counter remedies for indigestion. Aluminium compounds can also be used as a coagulant in drinking water treatment and as such are an important part of one of the key barriers to prevent pathogenic organisms entering drinking water. However careful the operation of this

water treatment process a small residue of aluminium, in the form of complex hydroxides, will be left in drinking water.

Drinking water is a relatively small source of exposure to aluminium compared to food, but it has been suggested that the chemical form of aluminium in drinking water could be more easily absorbed from the gastrointestinal tract than aluminium from food or in antacids. This has not been borne out by studies of healthy adults.

What standards apply to aluminium in drinking water?

The World Health Organisation has concluded that there is insufficient evidence to justify the development of a health-related guideline for aluminium in drinking water. It has however suggested that levels below 200 µg/l can be achieved in small supplies and 100 µg/l in larger well-run supplies. On this basis, the European Union has set a value of 200 µg/l as an indicator parameter. This is not set on health grounds but to prevent turbid and discoloured water caused by deposition of aluminium hydroxides in the distribution system. In the UK the 200µg/l limit has been adopted as a mandatory standard in order to help ensure that water quality at customers taps is not allowed to deteriorate.

Why are we bothered about aluminium?

In the 1970s, a condition in some patients receiving kidney dialysis, called dialysis dementia, was found to be due to aluminium in the water used to make up dialysis fluid. This is a very special situation in which patients are exposed through a route that bypasses the normal barriers to excessive absorption. A European regulation was introduced to limit the concentration of aluminium in water used to make up such fluids, to a maximum of 30 µg/l. This is rigorously adopted by the medical authorities in the UK, through appropriate pre-treatment of dialysis fluids. In addition water companies liaise closely with medical authorities to ensure that they are aware of all hospital or home dialysis units.

Subsequently it was suggested that aluminium in drinking water might be a factor in the development of other neurological diseases in the general population, particularly Alzheimer's disease. This is a common form of senile and pre-senile dementia, for which there is presently no effective treatment. Aluminium was identified as being present in the characteristic lesions in the brains of Alzheimer's patients, along with other chemical elements. A number of epidemiological studies were carried out to examine the association between aluminium in drinking water and the incidence of Alzheimer's disease in the population. Some of these found weak associations between aluminium in drinking water and Alzheimer's disease while others found no association. It is not possible to draw firm conclusions from any one study but there is an approximately even split between those finding positive associations and those finding no association, although more recent studies have tended to show no association.

The evidence for the role of environmental factors as primary causes of Alzheimer's disease is much weaker than the evidence for a genetic role and is almost entirely circumstantial. The view of the Alzheimer's Disease Society is that the findings so far do not convincingly demonstrate a causal relationship between aluminium and Alzheimer's disease. This is supported by the conclusions from WHO.

How is the quality of drinking water assured?

Most modern drinking water treatment plants achieve an average concentration of much less than the standard (typically 100µg/l or less) whether the aluminium comes from natural sources or from the use of aluminium salts in water treatment. Aluminium concentrations in treated water are rarely found at concentrations above the EU standard 200 µg/l. If this occurs immediate action is taken to fully restore compliance.

The World Health Organisation has concluded that there is insufficient evidence to justify the development of a health-related guideline for aluminium in drinking water. All authorities that have recently considered the subject of aluminium in drinking water, including WHO, have indicated that the significant benefits of using of aluminium salts in drinking water treatment outweigh any potential small risk.