Chemicals used in the UK for fluoridation of public water supplies

Permitted chemicals

• Drinking water safety is taken very seriously in the UK. Very strict European and UK regulations govern what can be added to public water supplies.

• All substances added to public water supplies must be on a list of approved substances issued by the Drinking Water Inspectorate under Regulation 25 of the Water Supply (Water Quality) Regulations 1989, and approved by the Secretary of State who is ultimately responsible. Under the legal authorisation of the Water Quality Regulations, the Drinking Water Inspectorate actively enforces the standards by undertaking regular checks.

• Only two compounds of fluoride are permitted for artificial fluoridation in the UK: hexafluorosilicic acid (H$_2$SiF$_6$), and disodium hexafluorosilicate (Na$_2$SiF$_6$). These compounds are included on the Drinking Water Inspectorate’s list of approved substances. They achieve the desired concentration of fluoride (1 part per million) reliably and safely, and must meet Department of Environment purity specifications.

• A national body of experts, The Committee on Chemicals and Materials of Construction for Use in Public Water Supply and Swimming Pools, assesses all chemicals that come into contact with drinking water or water for swimming pools.

• The chemicals used for water fluoridation are specifically manufactured to exacting quality standards, and, as stated above, must meet Department of Environment purity specifications. The chemicals are important co-products of the manufacture of phosphate fertilisers. Part of the manufacturing process involves ‘capturing’ gases using product recovery units. These units are technically similar to pollution scrubbers. However the important difference is that, in the process of the manufacture of fluoride chemicals, the end result is a valuable and useful resource, not a waste product.

• In Europe the permitted upper limit for fluoride in drinking water is 1.5ppm. (In US upper limit is 4ppm.) There is a wide margin of safety.

Fluoride in water

• Fluoride is the ionic form of the element fluorine. Fluorine is a highly reactive gas, and is never found in a free state in nature.

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• At 1ppm in water fluoride is fully ionised. It is this ionic fluoride – free fluoride ions in solution – that we are talking about when we talk of fluoride in water.

• Fluoride occurs naturally in all water, and is present as a result of having been dissolved out of the rocks over which the water has travelled.

• Fluoride ions in water are identical irrespective of whether naturally occurring or added.

• Fluoride for water fluoridation is a co-product of the manufacture of phosphate fertilisers. (It would be equally valid to describe phosphate fertilisers as a co-product of the manufacture of fluoridation compounds since both are valuable products.)

**Arsenic in fluoridated water**

UK-based antifluoridation group the National Pure Water Association and US antifluoridationist George Glasser (a retired film technician) claim that fluoridation increases arsenic levels in drinking water. (NPWA Press release July 2000)

• In fact fluoridation makes no measurable contribution to the concentration of arsenic in water supplies.

• Trace elements such as lead and arsenic are present in minute quantities in fluoride compounds, BUT, because of the very high dilution factor, fluoridation makes no measurable contribution to the concentration of these substances in the water supplies.

• The current standard for arsenic in water in the US and Europe is 50 micrograms/litre (50 parts per billion (ppb)).

• The 1998 European Water Quality Directive lowered the level to 10ppb. The requirements of the 1998 Directive are now being incorporated into UK Water Quality Regulations. (In the UK, some natural levels are above 10ppb and will therefore need to be reduced).

• Maximum levels of trace elements - including arsenic (and lead) - in water treatment chemicals used for fluoridation are laid down in product standards and details are incorporated in the product specifications.

• These levels are immeasurable when diluted thousands of times to achieve 1ppm fluoride content in water. It is not possible for example to measure arsenic in water at concentrations lower than about 1ppb.

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Briefing prepared by Sheila Jones

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4 In the UK, in Department of the Environment code of Practice. In the US by American Water Works Association and National Sanitation Foundation (NSF) standards.