Private Water Supplies

pH Correction

pH is a measure of the degree of acidity of the water. It is measured on a scale of 0-14 pH units, with low numbers being acidic, 7 being neutral and higher values being classed as alkaline. Many waters are a few units either side of neutral – the regulatory standard for pH in drinking water is within a range between 6.5 and 9.5. Many water supplies derived from source in peaty upland areas, will be slightly acidic due to dissolved organic acids.

Complex Household System (pH filter is smaller, buff coloured unit) – *Aberdeenshire Council*

The pH of the water, in itself, is not usually a significant issue – where it can become a problem is where metal plumbing is installed, such as copper piping or galvanized tanks. The acidic water can gradually dissolve the metals, leading to leaks and significant concentrations of the metals in the water itself, potentially at levels harmful to health. Cases of green hair where people have washed hair in private water supplies containing high concentrations of dissolved copper have been widely reported! More commonly, staining of sanitary ware and fittings can occur. Where properties contain old lead pipes, the health aspect becomes even more relevant, as significant concentrations of lead in water can result from relatively small lengths of lead plumbing.

The subject of water corrosivity is a complex one, and a number of factors are involved such as the relative concentrations of different dissolved minerals. In general, however, lower pH waters will tend to be corrosive to plumbing. If metal plumbing is present and the water has a natural pH much below 7, this should be corrected to reduce corrosivity.

The simplest method of elevating pH is to pass the water through a filter bed of alkaline granular material. Such filters are referred to as pH correction filters or neutralizing filters. The alkaline media is usually calcium carbonate or magnesium oxide, or a combination of both. The materials are processed to render them more suitable for water treatment use, and several proprietary brands of pH correction media are available. These neutralizing media, or a blend, will often be used to fill a sediment filter shell. On most supplies, pH correction will usually take place after other filtration stages but prior to UV disinfection. This is probably correct, but in such circumstances, sediment from the pH filter can cause fouling of the UV lamp. If this is the case, a further small filter may be required prior to the UV system. There should be no metal pipework between the pH filter and the UV system to avoid metal deposition on the lamp. If Chlorine disinfection is used, careful thought needs to be given to the siting of any pH correction as higher pH renders disinfection less effective.

Problems can occur due to the fact that apart from elevating the pH, water hardness is also increased. This can give rise to complaints from users especially if they are accustomed to very soft water, its taste and lathering properties. Scale formation can also affect any ultraviolet disinfection installed downstream, reducing its effectiveness.

If the water is free of particulate matter it is not unusual to pass water upwards through the media. The contact time to achieve pH equilibrium can be prohibitively long but times of a few minutes can often have some beneficial effect. Downflow filters can also be used, but these will

Small Household System with pH Correction - *Aberdeenshire Council*

usually require a backwash system. Even with careful design the alkaline material can clump together. Sediment, organic material and precipitated metals can also coat the media, making it less effective.

When designing a pH correction system for a small water supply, care must be given to sizing and residence times. If filters are undersized and contact times insufficient, the pH will not be sufficiently elevated, however if the water spends too much time in contact with the media it may become too alkaline, with other quality complications. Different media have differing levels of activity, so care must be taken to achieve the correct blend and on-site pilot trials may be advisable. Particular difficulties can arise where a property is only used intermittently through the year, meaning that at certain times, water can spend long periods in contact with the media. Competent specialist advice should be sought.

As a chemical reaction takes place between the water and the media in the neutralizing filter, the media gradually gets used up over time. This means that monitoring of the filter is required and replenishment of the media needs to take place from time to time. If media is simply topped up periodically there is a risk that insoluble deposits will accumulate in the filter and gradually reduce its performance. Therefore, it is good practice to occasionally take the filter off line, clean it out and completely replenish the media. Following replenishment, users may report a slight cloudiness and change in taste, but this should settle after a short amount of time.

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pH Correction - What You Need to Know - FAQ

Why does the pH of my water matter?

The main reason that there is a standard for pH in the regulations is that water with low pH can be corrosive to any metal plumbing, causing the water to contain excessive concentrations of metals such as copper, nickel, zinc and lead. Signs that corrosion is taking place include excessive leaks and staining of sanitary ware (often green where copper is present). High pH water can cause taste problems and irritate skin.

Could low pH water affect my health?

Although not generally a health issue in itself, water that has a slightly low pH can have a tendency to dissolve metals used in water pipes and fittings. Consuming water containing high concentrations of metals such as copper, nickel and zinc can have health effects. If your property is older it might contain lead plumbing and the consumption of lead has been clearly shown to be harmful to health.

How do I know if my water is the wrong pH?

Most natural waters in upland areas have a low pH due to dissolved natural organic acids. Testing of the pH will reveal that it is lower than 7 – the lower regulatory pH standard is 6.5, meaning the pH needs to be this or higher. Although water corrosivity is a complicated subject, a pH less than 6.5 is a good indication that the water is likely to be corrosive and some action is required.

What can I do to increase my pH?

Treatment to increase pH is relatively straightforward and usually involves passing water through a neutralising filter containing alkaline media such as limestone or magnesium oxide. Advice should be sought from a competent installer. It is important that the sizing of the filter and the blend of media within it is correct for your water supply, otherwise the pH could be corrected too much or not enough.

How should I install a neutralising filter?

The correct installation depends on individual circumstances and it is best to consult a specialist contractor. Neutralising filters should generally be fitted after any other filtration, so that the media does not become clogged by debris.

How easy are these filters to look after?

Neutralising filters rely on alkaline media reacting with the water to create a stable pH. The media is gradually used up in the process, and will eventually need replenishing. It is important that the amount of media in the filter is checked from time to time. This can be done by monitoring pH and watching for any staining of fittings and sanitary ware. If replenishment is necessary, ensure that the correct media is used to top the filter up. It is worth periodically cleaning out the filter vessel and completely changing the media.

Further advice on the safe treatment of private water supplies and the Private Water Supply Grant Scheme may be obtained from the Environmental Health Department of your local authority.