Boron (B)

Boron is widespread in the environment. Levels in well water are more variable and often higher than those in surface waters, most likely owing to erosion from natural sources. The maximum acceptable concentration of 5.0 mg/L has been set on the basis of health considerations.

Selenium (Se)

Food is our main source of selenium, and its toxic effects have most often been associated with diet. Drinking water containing selenium at the maximum acceptable concentration of 0.01 mg/L would be the source of only 10 per cent of total selenium intake.

Aluminum (Al)

There has been no maximum acceptable concentration set for aluminum in drinking water. In large quantities, it causes damage to the nervous system, kidneys and heart.

Arsenic (As)

Natural sources, such as bedrock, often contribute to the arsenic content of drinking water and groundwater. A number of disorders have been associated with the intake of arsenic in drinking water. However, there is no evidence of any specific illness caused by drinking water containing arsenic at the maximum acceptable concentration of 25 ug/L.

Barium (Ba)

Barium is present in both igneous and sedimentary rocks. Despite a relative abundance in nature, barium occurs only in trace amounts in water. However, barium can cause serious toxic effects to the heart, blood vessels, and nerves. For this reason the maximum acceptable concentration of barium in drinking water has been set at 1.0 mg/L.

Cadmium (Cd)

Food is the main source of cadmium intake for humans that are not exposed through their work place. Because it is difficult to reduce cadmium intake from food, intake from water should be as low as possible.

The maximum acceptable concentration of cadmium in drinking water is 0.005 mg/L.

Chromium (Cr)

Trivalent chromium, the most common naturally occurring state of chromium, is not considered to be toxic. However, in raw water it maybe oxidized to hexavalent chromium during chlorination. In this form, it is toxic to humans.

The maximum acceptable concentration is 0.05 mg/L.

Copper (Cu)

Copper and its compounds are widely distributed in nature, and this element is found frequently in surface water and in some groundwater. Copper is an essential and beneficial element in human metabolism and is generally considered to be non-toxic except at high doses.

Copper contributes to corrosion of aluminum and zinc and also imparts an undesirable bitter taste to water. Staining of laundry and plumbing fixtures occurs at copper concentrations above 1.0 mg/L.

The aesthetic objective for copper in drinking water is set at a maximum of 1.0 mg/L.

Lead (Pb)

Natural waters seldom contain more than 0.005mg/L lead. Lead may be present in tap water from natural sources or from household plumbing systems containing lead in pipes, solder or service connections to homes.

Lead has long been recognized as a general metabolic poison which causes a variety of human disorders, particularly of the nervous system. Children are more susceptible to the effects of lead poisoning.

The maximum acceptable concentration of lead in drinking water is 0.01 mg/L.

Zinc (Zn)

Zinc is an essential element and is considered to be non-toxic. Water containing zinc levels above 5.0 mg/L tends to be opalescent, develop a greasy film when boiled, and have an undesirable astringent taste. Therefore, the aesthetic objective is set at a maximum of 5.0 mg/L.

Uranium (U)

Uranium may enter drinking water from naturally occurring deposits. Phosphate fertilizers may contain uranium at an average concentration of 150 ppm and can also contribute uranium to groundwater. Drinking large quantities may result in damage to the kidneys. The maximum acceptable concentration is set at 100 ug/L.

Mercury and Cyanide Testing

Communities with populations greater than 5000 may be required to test for mercury and cyanide.

Mercury (Hg)

Mercury is a toxic element, with particularly damaging effects on the brain and central nervous system. It serves no beneficial physiological function in man.

The maximum acceptable concentration for mercury is set at 1 ug/L. Surface water and groundwater are generally well below this level.

Cyanide (CN)

Cyanides are used in many industrial processes, so it follows that industrial effluents are the major sources of cyanide contamination of water.

Cyanide is toxic to man. The maximum acceptable concentration is 200 ug/L.

Total Hardness

Water hardness is mainly caused by the presence of calcium and magnesium. It is expressed as the equivalent quantity of calcium carbonate. Scale formation and excessive soap consumption are the main concerns with hardness. When heated, hard waters have a tendency to form scale deposits. This is a familiar problem in the teakettles and water heaters of homes with this problem.

Depending on the interaction of other factors such as pH and alkalinity, hardness levels between 80 and 100 mg/L are considered to provide an acceptable balance between corrosion and incrustation. Water supplies with a hardness greater than 200 mg/L are considered poor but tolerable; those in excess of 500 mg/L are unacceptable for most domestic purposes.

Because water softening may introduce undesirably high quantities of sodium into drinking water, it is recommended that a separate unsoftened supply be used for drinking and cooking. The aesthetic objective is set ata maximum of 800 mg/L.

Calcium (Ca)

Calcium in water supplies results from passage through or over limestone, dolomite and other calcium containing deposits. Small concentrations of calcium carbonate actually combat corrosion of metal pipes by laying down a protective coating. However, higher levels of dissolved calcium salts can come out of solution when heated to form scale in boilers, pipes and cooking utensils. Calcium contributes to the total hardness of water. There is no aesthetic objective or maximum acceptable concentration set for calcium. (See Total Hardness)

Magnesium (Mg)

Magnesium is found in all natural waters. High levels in groundwater are probably the result of contact with magnesium-containing rock formations.

Magnesium is a major contributor to water hardness and may also contribute undesirable tastes to drinking water. The aesthetic objective is set at a maximum of 200 mg/L.

Total Alkalinity

Alkalinity is a water's acid-neutralizing capacity. This is determined by how much carbonate, bicarbonate and hydroxide is present. Excessive alkalinity levels may cause scale formation. The aesthetic objective is set at a maximum of 500 mg/L.

Carbonate (CO3)

Carbonates can only exist if the pH of the water exceeds 8.3. This seldom occurs in natural waters. No aesthetic objective or maximum acceptable concentration has been set for carbonates alone. (See Total Alkalinity)

Bicarbonate (HCO3)

Bicarbonate is the major form of alkalinity. In excessive amounts, bicarbonates, in conjunction with calcium, may cause scale formation in heated waters. (See Total Alkalinity)

Hydroxide (OH)

Hydroxide contributes to the total alkalinity of a water. It is almost never present in natural waters. See Total Alkalinity.

Sodium (Na)

Weathering of salt deposits and contact of water with igneous rock provide natural sources of sodium. Another potential source of sodium in water supplies is the water-softening process which replaces calcium and magnesium (hardness) with sodium. People on sodium restricted diets should consult with their doctor on this issue. The aesthetic objective is set at a maximum of 300 mg/L.

Potassium (K)

Potassium ranks seventh among the elements in order of abundance, yet its concentration in most drinking waters seldom reaches 20 mg/L. There is no maximum acceptable concentration or aesthetic objective set for this element.

Chloride (Cl)

Concentrations of chloride in excess of 250 mg/L may impart a salty taste to the water, although there is no evidence of adverse health effects from drinking it. The salty taste is variable and dependent on the chemical composition of the water.

A high chloride content may harm metallic pipes and structures as well as growing plants.

The aesthetic objective is set at a maximum of 250 mg/L.

Sulfate (SO4)

Sulfate occurs naturally in water and maybe present in natural waters in concentrations ranging from a few to several thousand mg/L. Concentrations in excess of 500 mg/L , especially if the magnesium content is also high, may have a laxative effect or cause gastrointestinal irritation. It may also result in a noticeable taste. The aesthetic objective is set at a maximum of 500 mg/L.

Nitrate (NO3)

The maximum acceptable concentration of nitrate in drinking water is 45 mg/L as NO3. In excessive amounts it poses a health risk.

Iron (Fe)

At levels above 0.3 mg/L, iron stains laundry and plumbing fixtures and causes an undesirable taste. The precipitation of excessive iron causes a reddish brown color in the water. It may also promote the growth of iron bacteria, leaving a slimy coating in piping. The presence of iron bacteria can also cause a 'rotten egg' odor in the water and a sheen on the surface of the water. The aesthetic objective is set at a maximum of 0.3 mg/L.

Manganese (Mn)

Manganese can cause staining to plumbing and laundry, and undesirable tastes in beverages. Also, it may lead to the accumulation of bacterial growth in the piping. The aesthetic objective is set at a maximum of 0.05 mg/L.

pH

Natural waters usually have pH values in the range of 4 to 9 and most are slightly basic (i.e. greater than7) because of the presence of bicarbonates and carbonates. Corrosion effects may become significant at a pH below 6.5 and scaling may become a problem at a pH above 8.5. For this reason an acceptable range for drinking water pH is from 6.5 to 9.0.

Specific Conductivity

Specific conductivity is a measure of the ability of water to carry an electric current. This ability depends on the presence of ions, which are present with dissolved solids in the water. Waters with high dissolved solids generally don't taste as good and may leave a white film on dishes, etc.

The aesthetic objective for total dissolved solids is 1500 mg/L and is approximately equivalent to a conductivity of 1500 uS/cm.

Sum of Ions

Sum of ions indicates the concentration of ions in the water (i.e. dissolved solids). The aesthetic objective for total dissolved solids is a maximum of 1500 mg/L. See Specific Conductivity.