Environmental
Analytical Laboratories

General Chemical Package

CALCIUM (Ca)
The presence of calcium in water supplies results from passage through or over limestone, dolomite and other calcium containing deposits. Small concentrations of calcium carbonate combat corrosion of metal pipes by laying down a protective coating. Higher levels of calcium salts can precipitate 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 present in all natural waters and 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 HARDNESS
Water hardness is mainly caused by the presence of calcium and magnesium and 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. 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 at a maximum of **800 mg/L**.

TOTAL ALKALINITY
Alkalinity is a water's acid-neutralizing capacity and is primarily a function of carbonate, bicarbonate and hydroxide content. Excessive alkalinity levels may cause scale formation. The aesthetic objective is set at a maximum of **500 mg/L**.

CARBONATE (CO_3)
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 (HCO_3)
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. Persons on sodium restricted diets should consult with physicians. 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. Therefore, the aesthetic objective is set at a maximum of **250 mg/L**. However, the salty taste is variable and dependent on the chemical composition of the water. No evidence has been found to indicate that ingestion of chloride is harmful to humans. A high chloride content may harm metallic pipes and structures as well as growing plants.

SULFATE (SO_4)
Sulfate occurs naturally in water and may be 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 (NO_3)
The maximum acceptable concentration of nitrate in drinking water is **45 mg/L** as NO_3. In excessive amounts it contributes to the illness known as methemoglobinemia in infants. Sources of nitrate in water include decaying plant or animal material, agricultural fertilizers, manure, domestic sewage or geological formations containing soluble nitrogen compounds.

pH
Natural waters usually have pH values in the range of 4 to 9 and most are slightly basic (i.e. greater than 7) 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 a water to carry an electric current. This ability depends on the presence of ions and is therefore an indication of the concentration of ions (i.e. dissolved solids) in the water. Waters with high dissolved solids generally are of inferior palatability and also 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**.

TOTAL DISSOLVED SOLIDS (TDS)
TDS is a measure of the amount of dissolved substances in the water and gives a general indication of the quality of the water. Waters with high dissolved solids generally are of inferior palatability and also may leave a white film on dishes, etc. The aesthetic objective for total dissolved solids is **1500 mg/L**.

FLUORIDE
Fluoride present in soil and rocks can end up in trace amounts in ground water. Also, fluoride present in water can be the result of the addition of fluoride to domestic water supplies. The maximum acceptable concentration of fluoride in drinking water is **1.5 mg/L**.

CONTACT

SRC Environmental Analytical Laboratories
143-111 Research Drive
Saskatoon, Sask., Canada S7N 3R2
T: 306-933-6932
T: 1-800-240-8808 toll-free in Canada
E: analytical@src.sk.ca
www.src.sk.ca/analytical