

Chloride

Chloride is the negatively charged ion which comes from the element chlorine. Chlorine is used in various forms as a disinfectant, in bleach, and to purify water. The chloride ion is the most common form of chlorine, and is one of the two elements that make up salt, or sodium chloride. We use salt to make food taste better, and in many communities, rock salt is used to melt snow on streets and sidewalks. This salt gets dissolved by rain and melting snow. Chloride also shows up in water around areas that have been treated with another de-icer, calcium chloride. As sodium chloride or calcium chloride dissolves in water, the ions separate and move freely. Chloride has a negative charge, while sodium or calcium has a positive charge. When you take a measurement for chloride, you are measuring the concentration of chloride ions in the water. Most of the time, scientists can hypothesize whether the chloride came from NaCl or CaCl_2 if levels of sodium or calcium are the same as the chloride.

But where does rock salt that is spread onto roadways end up? Salt does not just disappear or evaporate. It is carried by rain and melting snow into storm sewers, small streams, or groundwater and eventually into larger streams and ponds. Unpolluted water has chloride levels of less than 1 milligram per liter (mg/l), although some waters may have more depending on weathering or leaching from nearby mineral-rich soils and rocks. A measurement from Wappingers Creek in 1905 (before the use of road salt) showed Cl^- concentrations of 0.6 mg/L, and normal concentrations at Hubbard Brook Experimental Forest are about 0.5 mg/L. During spring runoff, levels of chloride can range from 10,000 mg/l in ditches along rural highways to 25,000 mg/l along urban highways. At present, Cl^- concentrations in the Hudson River are around 600 micro moles per liter, or 21 mg Cl^-/L .

Why should we care about salty runoff? Salt pollution in streams and ponds can kill aquatic vegetation and damage fish eggs, young fish, and other aquatic organisms. Salt also corrodes bridges and cars and causes damage to underground pipes.

Road salt can also seep into groundwater and become a serious source of pollution. Many people get their drinking water from wells that tap the groundwater. If a lot of salt gets into the groundwater, well water may taste unpleasantly salty. The Environmental Protection Agency recommends that people don't drink water that has more than 20 mg/L of sodium, because it may cause problems with people who suffer from hypertension.

What does this mean?

Clean water has less than 5 mg/l chloride. Water with more than 250 mg/l chloride is considered not drinkable by the EPA. Chlorides can enter water from road salt, soil leaching, and industrial and animal wastes.