

Lesson Four

CHLORIDE

(Cl)

Chloride is from sodium chloride (NaCl or salt). Once in water, NaCl dissolves and is separated into its individual ions: Na^+ & Cl^- . Sodium is a cation that exchanges with other positive ions. Sodium (Na) can also be taken up by negatively charged organic material in the soil. Chloride is less likely to get exchanged, it is not adsorbed by the soil like cations. Chloride (Cl) tends to be more conservative and “stays” in the water. It follows water through its tortuous soil path into the groundwater.

Chloride found in groundwater can come from at least four processes. A possible input of chloride into groundwater is a coastal occurrence and comes from marine aerosols. Second, it can be trapped and buried in the soils near sea level through either tidal or geologic changes. A third product from using road salt and the fourth is from septic systems.

The amount of chloride found in the groundwater tells how effective the natural filtration process is for that particular soil. If the sample taken from the groundwater contains high concentrations of the bromide ion (an element also found in seawater) then the source is marine. If the sample is low in bromide, the sample is from road salt. The source is determined by a ratio of the bromide and sodium ion to water (1:160).

VOCABULARY

Cation exchange-

Ion- An atom or a group of atoms that has acquired a net electric charge by gaining or losing one or more electrons.

Cation- An ion or group of ions having a positive charge

Anion- A negatively charged ion

Catalyst- A substance, usually used in small amounts relative to the reactants, that modifies and increases the rate of a reaction without being consumed in the process.

Tortuous- consisting of many twists and turns through large and small spaces

Porosity (porous)-determines the capacity of the material to hold water (small pore space between soil particles holds more water decreases permeability)

Permeability- determines the ability to yield water (large pore space between soil particles will increase speed of water movement through the soil and give it high permeability)

ACTIVITY

SEE “OPTIONAL EXTENSION” IN LESSON ONE ON PAGE 23

Use the idea of the powdered drink mix on the soil as road salt washed off roads and onto soils. As you increase precipitation the water in the aquifer will change color. Thus showing how salt dissolves in rain and drains through to groundwater.

HOMEWORK

1. Where is your town salt storage? 2. Is it covered or exposed to the air?
3. Based on its location how close is the salt to permeable soils or a surface water body?
4. What can you do to make sure the salt storage in your town is managed properly?