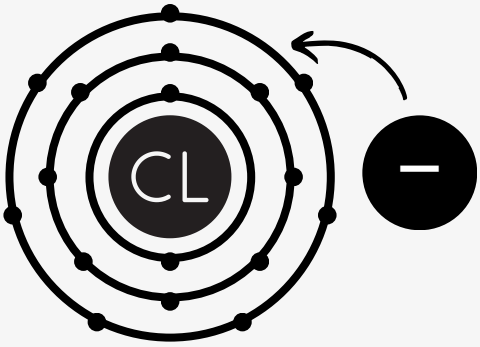
CHLORIDE

Community Science Institute
Partnering with Communities to Protect Water



Chlorine + electron = **chloride**

WHAT IS CHLORIDE?

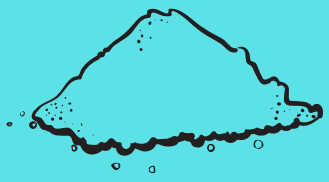
Chloride is a naturally-occurring ion formed when chlorine *gains* an electron. It most frequently occurs in salt compounds like **sodium chloride**.

In small amounts, chloride is essential for our cells to function.

WHY DO WE MEASURE CHLORIDE?

Brackish or marine ecosystems naturally have a much higher concentration of chloride than freshwater. We test chloride concentrations in streams and lakes to see if they fall within the normal range for these ecosystems.

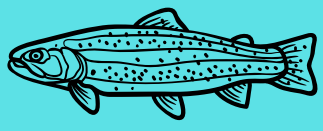
Typical chloride concentrations
- Freshwater: <50 mg/L
- Brackish water: ~300 mg/L
- Seawater: ~20,000 mg/L



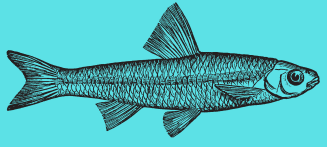
Chloride is often the active ingredient in road salts. It can also be introduced to waterways via irrigation runoff or salt mines.

In the environment, chloride can trigger the mobilization of heavy metals like lead and mercury from soil particles into water. Within an organism, some chloride is normal or even beneficial. However, in large amounts, chloride can interfere with healthy cell function. The following organisms start to see sublethal effects at:

Daphnia sp. (water fleas)
372 mg/L chloride



Rainbow trout
922.7 mg/L chloride



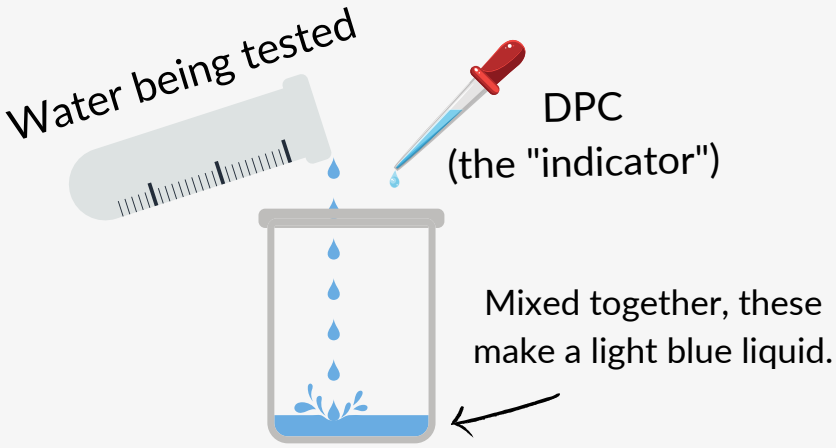
Fathead minnows
433.1 mg/L chloride

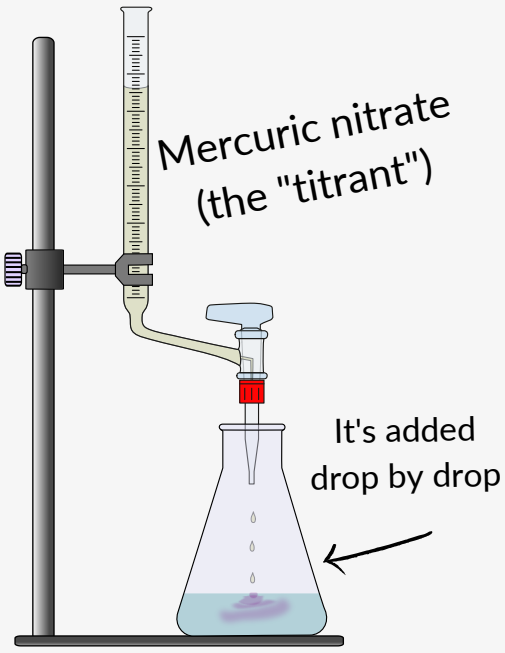
January 2023

HOW DO WE MEASURE CHLORIDE?

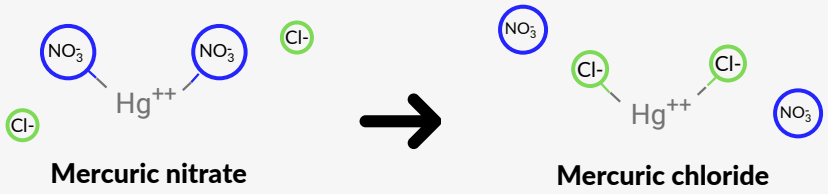
Chloride is measured using a laboratory test that uses an indicator and a titrant, as illustrated below!

First, a substance called DPC is added to the water being tested for chloride. DPC is called an "indicator" because it will cause a visible change to our mixture when the test is complete.



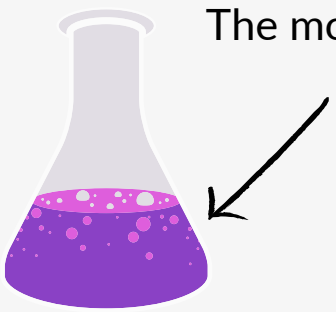


Next, our chemists add mercuric nitrate, a compound made up of the element **mercury** bound to two molecules of **nitrate**, to the mixture drop by drop.



The potential bond between chloride and mercury is *stronger* than the bond between mercury and nitrate. As mercuric nitrate is added, the chloride in the water replaces the nitrate to become **mercuric chloride**.

Eventually, every ion of chloride in the water has bound to the mercury. This is where our indicator, DPC comes in. When there is no more chloride for the drops of mercuric nitrate to react with, the mercuric nitrate reacts instead with the DPC.



The moment this happens, our mixture turns a bright purple because of the chemical reaction between mercuric nitrate and DPC!

From there, we calculate the **concentration of chloride** in the water based on how much titrant (mercuric nitrate) was needed to turn the mixture purple!