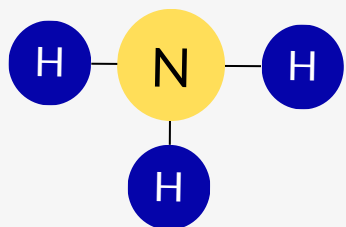


AMMONIA

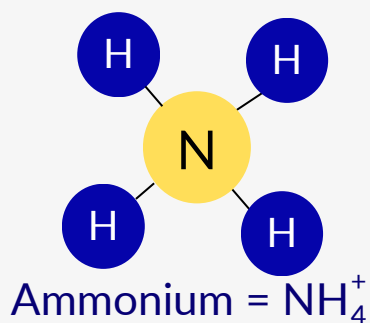


Ammonia = NH_3

WHAT IS AMMONIA?

Ammonia (NH_3) is a common form nitrogen takes in the environment. A compound called ammonium (NH_4^+) may also be referred to as "ionized ammonia". In water, ammonia and ammonium easily change form in response to changes in the water's pH and temperature.

Ammonium is less bioavailable than ammonia, meaning nitrogen in the form of ammonium (NH_4^+) is less likely than nitrogen in the form of ammonia (NH_3) to be taken in by aquatic life and thereby have harmful impacts.



Ammonium = NH_4^+

WHY DO WE MEASURE AMMONIA?

Nitrogen can negatively impact aquatic ecosystems in a variety of ways. Some forms of nitrogen are harmful because they lead to an imbalanced ecosystem (e.g. through promoting excessive growth of plants, algae, and cyanobacteria). In contrast, ammonia is *directly* toxic to aquatic life.

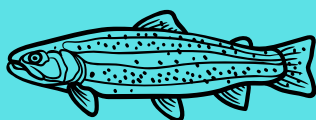


Nitrogen in the atmosphere can be directly converted to ammonia by nitrogen-fixing bacteria. More commonly, ammonia is introduced to soil or waterways through waste and decomposition. Ammonia is the major form of nitrogen present in animal and human waste, so high ammonia levels in waterways may indicate contamination from wastewater or manure.

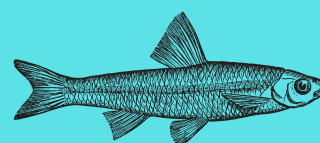
Ammonia can be toxic to freshwater organisms even at very low levels. Lethal effects from ammonia (NH_3) have been documented on these species at levels as low as:



Daphnia sp. (water fleas)
2.7 mg/L ammonia



Rainbow trout
0.16 mg/L ammonia



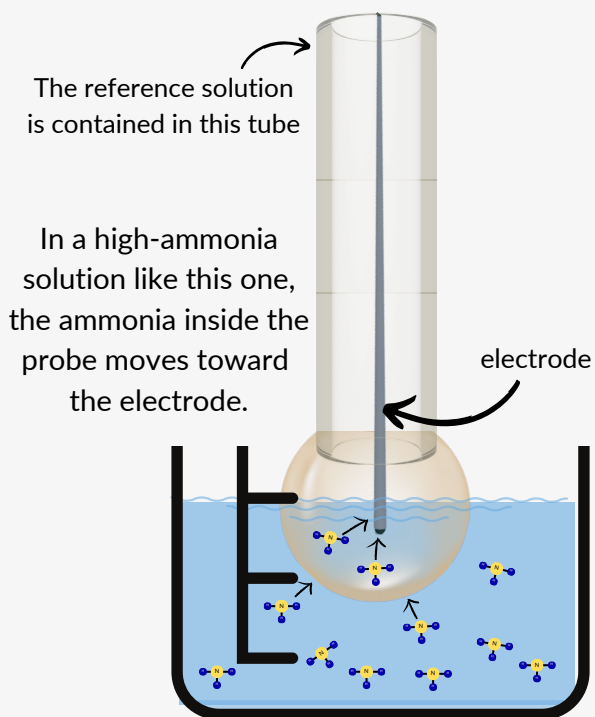
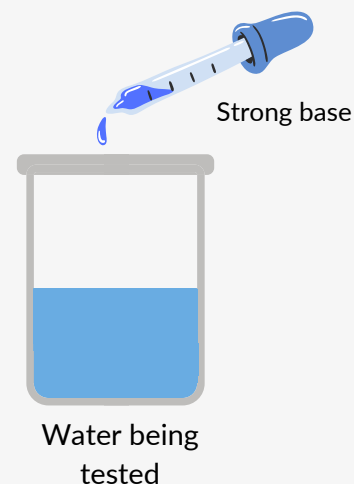
Fathead minnows
0.75 mg/L ammonia

HOW DO WE MEASURE AMMONIA?

Because ammonia and ammonium convert easily from one form to the other, the test used for ammonia at Community Science Institute requires first converting all ammonium in the sample to ammonia. The results posted on CSI's database reflect the concentration of nitrogen from both ammonium (NH_4^+) and ammonia (NH_3).

First, a strong base (a solution with high pH) is added to the water sample. This causes all the ammonium (NH_4^+) to convert to ammonia (NH_3).

Once all the ammonium in the solution has been converted to ammonia, an **ammonia probe** is used to measure the concentration of nitrogen from ammonia.



An **ammonia probe** contains a reference solution (a solution with a known ammonia concentration) and an electrode. The probe is inserted into the water being tested.

If the ammonia ions in the water being tested are more concentrated than those in reference solution, they will move toward the probe. If they are less concentrated, they will move away from the probe.

The electrode inside the probe senses these interactions and uses them to calculate the solution's ammonia concentration.