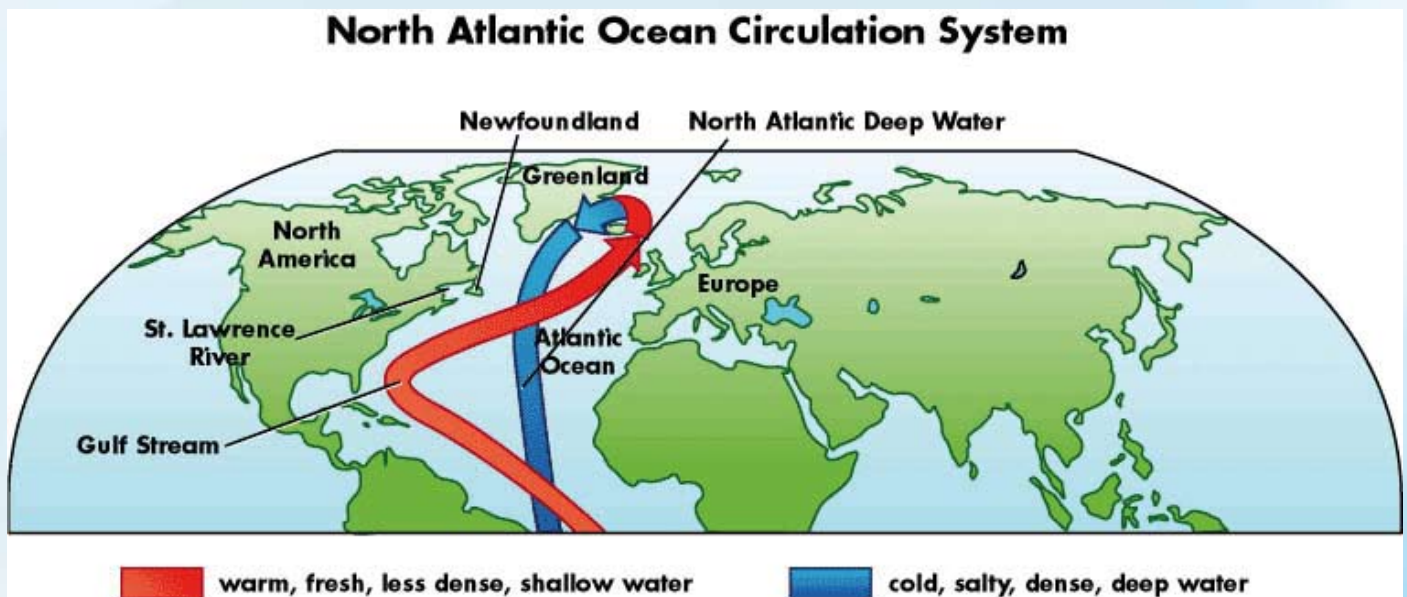


Deep water formation

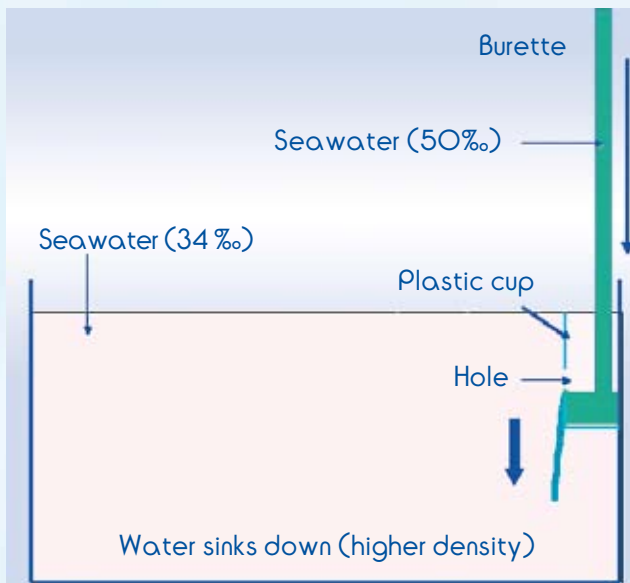
Scientific background:

- ▶ Deep water formation describes a localised phenomenon that takes place in 2 particular regions on Earth:
 - 1) the North Atlantic (North Atlantic Deep Water, in the Norwegian, Greenland and Labrador seas)
 - 2) the Antarctic (Antarctic Bottom Water, in the Weddell and Ross seas)
- ▶ Deep waters are formed when, due to changes in temperature and salinity, surface waters become denser (and hence heavier) and sink down towards the bottom of the ocean. This is one of the main gears of a circulation that extends throughout the world ocean and can thus influence the climate of our Planet (see the Poster 'Ocean Conveyor Belt in the 'Support' folder).



Deep water formation (1)

►► Scheme



►► Instructions

- ▶ Fill the aquarium with seawater (ca. 34‰)
- ▶ Take the plastic cup and make a hole ca. 2 cm from the bottom
- ▶ Put the plastic cup into the filled aquarium so that it is totally submerged and fix it so that the top rim of the cup is slightly below the surface
- ▶ Put 5 g of salt in a glass add 100 ml of tap water to dissolve it (final salinity = 50‰)
- ▶ Install the burette so that the tip is in the plastic cup near its bottom
- ▶ Fill the burette with the prepared water of higher salinity
- ▶ Open the valve of the burette so that the higher salinity water flows slowly and continuously into the plastic cup

The plastic cup fills slowly from the bottom ; when the water with the higher salinity (higher density) reaches the hole, it starts to drop down within the aquarium. The down-flow can be seen because of the different optical properties of the two water bodies.

Note: The down-flow of the water can be seen better by applying a grid to the aquarium wall opposite the observer, or by lighting the aquarium from the front and projecting an image of it onto a white wall!

►► Protocol

- ▶ Burette
- ▶ Glass
- ▶ Balance
- ▶ Aquarium
- ▶ Plastic cup (ideally transparent)
- ▶ Seawater (ca. 34‰)
- ▶ Water
- ▶ Salt
- ▶ (Grid or lamp; facultatively)