Experiment: Thermohaline circulation

Objective:
Investigate the motion of water masses at different temperatures next to each other. These motions are observed in our oceans, and exchange water between the equator and the poles.

Background:
A water mass in the sea is a "big enough" quantity of water with homogeneous properties, for instance temperature or salinity. A cold water mass (for example, at the poles) is denser that a warm water mass (at the equator).
Before starting, formulate your hypothesis on the motion of two water masses with different temperatures next to each other: where does each mass go? Write your idea below.

Materials:
- Tank with water;
- Ice pack and rubber band;
- Heating coil (waterproof);
- Blue/Red food colorants;

Group structure

Not more than 4 persons

1-2p experiment
1p documentation
1p presentation

1) Procedure:
Since you will need to see the movement of the water masses due to their temperature, be careful not to touch the tank or blow on it. Be careful with the coil: when plugged in, it is hot! Fix the ice pack to one side of the tank with the rubber band and the coil on the other side. Wait 1 min and then release ~15 drops of red colorant near the coil and blue near the ice. While the experiment proceed, note your observations in the table on the side.
Draw your instrumental setup below here!

2) Observations:

At regular intervals, observe carefully where do the red and blue water masses go, and describe it in the table below. In the end, measure the surface and bottom temperatures.

Time (minutes)	Observations logbook
START:	
+5min:	
+10min:	
+15min:	
(+20min:)	

3) Analysis:
Initially all the water is at the same temperature. Where do the cold blue and the warm red water go at the beginning? What happens to the blue mass when it encounters the bottom? How are the colours distributed after 5 minutes? And after 15 minutes?

4) Interpretation
1. Compare results with your hypothesis: how would you describe the water motion?
2. Why is the motion of the blue water not stopping when it encounters the tank bottom?
3. If we think of the water tank as of the Atlantic Ocean, from where to where do the water masses move?

(If your answers do not fit here, you can write behind)