SPEED OF TURBIDITY CURRENTS

Purpose

To see how density, volume, and temperature affect the speed of turbidity currents.

Instructions

Activity I Density

1. ***Draw up a table to record the following information: salt mixture, density, time to reach 50cm, 100cm and 150cm. Or use the table provided.***

2. ***Choose the least dense solution and measure its density using the hydrometer.***

3. ***Pour 200ml of the solution quickly into the trough and start the timer as soon as it reaches the bottom.***

4. ***Record the time at which it reaches the 50cm, 100cm and 150cm marks.***

5. ***Stir the water and allow it to become still.***

6. ***Repeat twice with the same solution. Pour it at the same rate and from exactly the same position.***

7. ***Repeat instructions 2 to 5 with each of the other solutions in order of increasing concentration.***

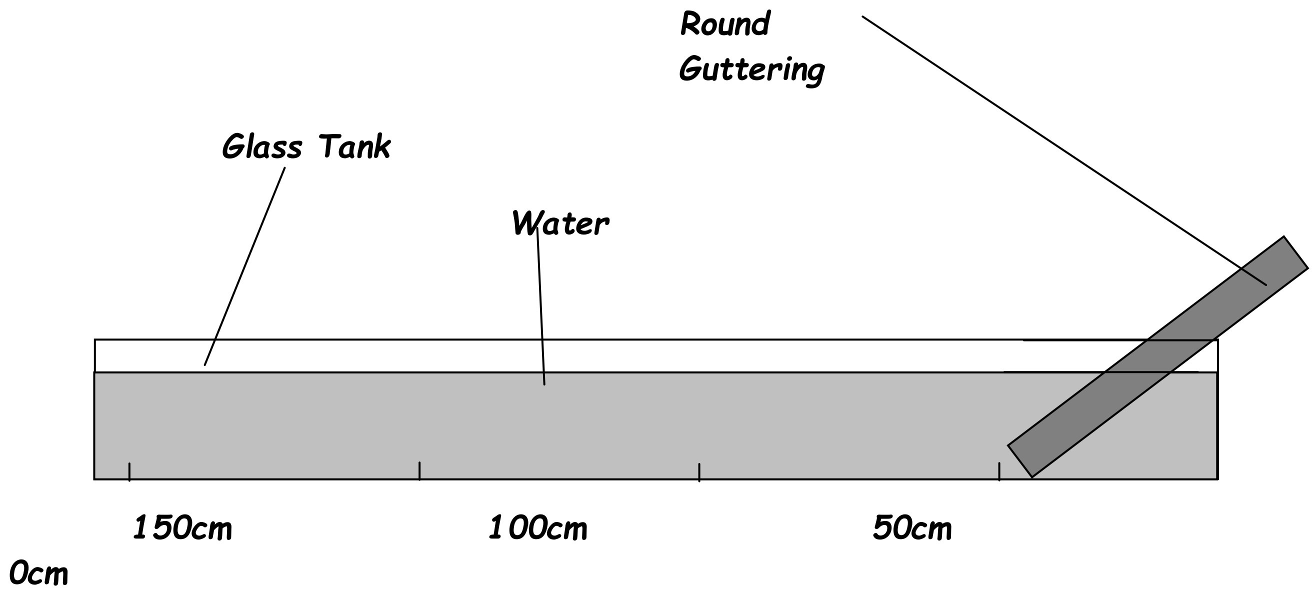
8. ***Plot your results and draw your conclusions.***

Activity II Volume

Repeat the instructions for Activity I except that in this case you will vary the volume. Use the ¼ concentration salt solution and use first 100ml then 200ml, then 300ml and lastly 400ml.

Activity III Temperature

Follow the instructions broadly for Activity I but use the room temperature and cold solutions
Take 200ml of the room temperature solution, measure its temperature and pour it into the tank then measure the temperature of the cold solution and pour 200ml of it into the tank.



TURBIDITY CURRENTS

Salt mixture	density g per cc	volume (cc)	temperature (°C)	time to in (s)		
				50cm	100cm	150cm

Teacher's Section

Requirements

1. *Long glass tank about 200cm by 10cm by 10cm marked at 50cm, 100cm, and 150cm from bottom end of guttering.*
2. *Section of round guttering cut obliquely at the end so that it fits against the floor of the tank.*
3. *100ml and 200ml and 400ml beakers.*
4. *The following four salt solutions: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ maximum concentration and maximum concentration. Maximum concentration is 330g per litre. All solutions should be tinted with food colouring. For Activity I you will need 600ml of each concentration. For activity II you will need 1 litre of $\frac{1}{4}$ concentration. For activity III you will need 200ml of the $\frac{1}{4}$ concentration at room temperature and 200ml which has been in the fridge. It is helpful if the different concentrations are each dyed a different colour using food colouring.*
5. *Hydrometer suitable for measuring 1.0 to 1.25 g per cc*

Notes

Students need to work in pairs.

The tank needs to be emptied and the water replaced after each pair of students and the problem of the changing composition of the tank water should be commented on by the students in their evaluation. Slope is another important control but it is difficult to demonstrate without a deep tank.

A saturated solution of NaCl is easily made up and kept and can then be diluted as required.

Results

Increased density caused by more salt or lower temperature increases speed because a denser liquid has a greater kinetic energy. Increased volume also increases speed.

Cost

Tank, £25 if made, (see making equipment); £50 if bought.