LAB 22: HYDRODYNAMICS

QUESTION

How does the density of liquids affect their interaction when they come in contact with each other?

SAFETY

Do not eat or drink any of the materials when finished.

MATERIALS

2 straws, tape (Scotch or other), water, cooking oil, salt, marking pen

PROCEDURE

Hydrodynamics is the study of the movement of fluids. When designing dams, canals, reservoirs, and dry docks, it's important for engineers to understand how water acts when two bodies of water come into contact. In this lab, you will be simulating a situation like this by connecting two flexible straws. When a freshwater stream flows into the ocean or when the Pacific Ocean meets the Atlantic, scientists need to know how the water will act in order to ensure that it is safe for boats, scuba divers, and animals.

1. Connect the short ends of the flexible straws by sliding one inside the other. Wrap some tape around the connection to seal it watertight.
2. Hold the straws in the shape of a "U" and fill the straws with water so that each side is about ⅔ full. Mark one side L and one side R.
3. Hold the straws level with each other and note the height of the water in each side.
   The water level in the left side is _____ (higher than, lower than, the same as) the right side.

4. Now raise the left straw higher than the right straw and note the height of the water in each side.
   The water level in the left side is _____ (higher than, lower than, the same as) the right side.
5. Now get the two sides even again and put a finger over the end of the left straw and raise the right one. Note the height of the water in each side.
   The water level in the left side is _____ (higher than, lower than, the same as) the right side.
6. Now get the two sides even again and put a finger over the end of the right straw and raise the right one. Note the height of the water in each side.
   The water level in the left side is _____ (higher than, lower than, the same as) the right side.
7. Now get the two sides level again and put some oil in the right side. Note the level of water and oil in each side.
   The water level in the left side is _____ (higher than, lower than, the same as) the right side.
8. Now have an assistant sprinkle some salt in the left straw and allow it time to dissolve. Note the difference between the levels now and before the salt was added.

Post-Lab Questions

1. From your experience in this lab, would you say that the level of fluid on each end of a canal will change until the pressure, volume, or depth on each side is the same?
2. The Panama Canal connects the Pacific Ocean and the Atlantic Ocean. One body of water is saltier than the other. Which side of the canal will be higher, the saltier or the less salty side? (Hint: A salt molecule is heavier than a water molecule.)

Extension

Find the combination of liquids that gives you the biggest difference in the heights of the two sides. Try liquids that you have around the house, such as rubbing alcohol, Kool Aid, etc.