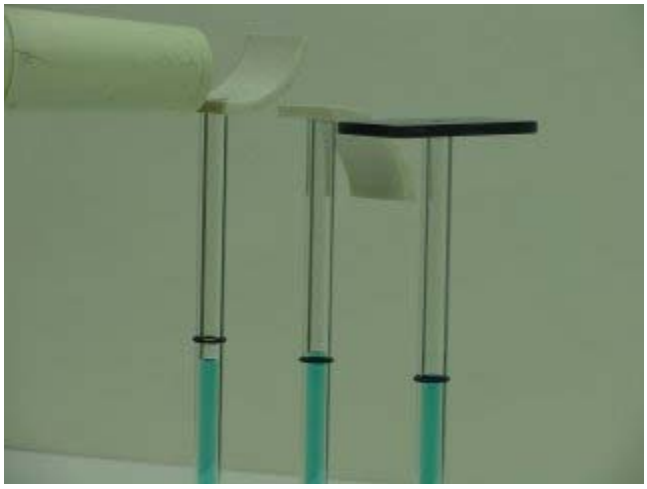
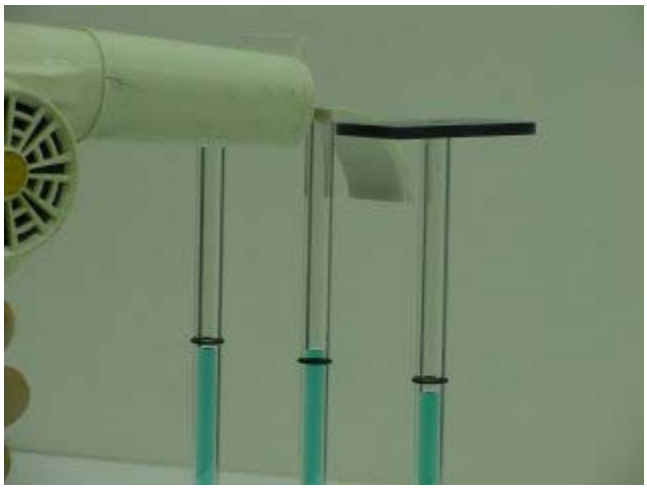
Answer #231

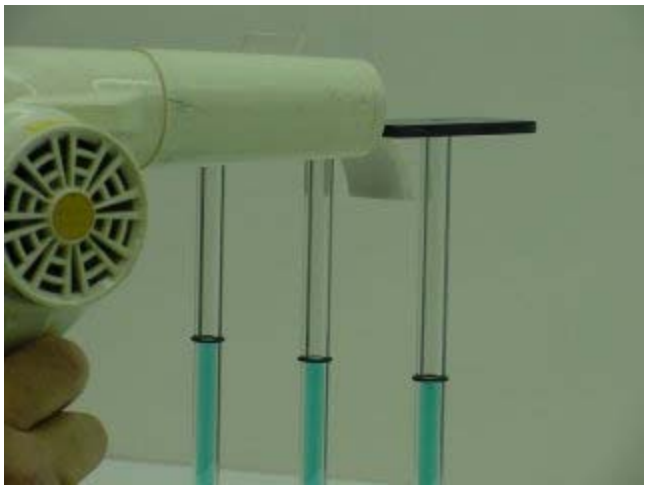
The answer to Part 1 is (b): the water level in the tube with the concave flange will go down, as can be seen in an mpeg video by clicking your mouse on the picture below.



The answer to Part 2 is (a): the water level in the tube with the convex flange will go up, as can be seen in an mpeg video by clicking your mouse on the picture below.



The answer to Part 3 is (c): the water level in the tube with the flat flange will remain the same, as can be seen in an mpeg video by clicking your mouse on the picture below.



At first glance, these all might be seen as examples in which the "Bernoulli effect" provides the predominant force, but upon more detailed investigation this appears to be demonstrably not so. In fact, the Bernoulli effect plays a relatively small part in what is happening here, as it does in many phenomena often attributed to the "Bernoulli effect."

Part 1: Here the concave flange provides the centripetal force required to make the air move in its curved path along the flange, with the reaction force increasing the pressure in the tube and pushing the water down.

Part 2: It would seem that the Coanda effect plays the most important part with the convex flange: the air flow "sticks" to the convex surface, and the reaction force reduces the pressure in the tube.

Part 3: If there is a force on the water due to a change in the air pressure in the tube, it is clearly very small compared with the two previous cases. This is often the case when considering Bernoulli effects. For the overwhelming number of applications of moving air streams, if you think that the answer is the Bernoulli effect, you probably should think again. For a longer discussion of this issue and a number of examples, see our demonstration of the air foil, perhaps the most important case of misuse of the Bernoulli effect, and the reference links attached to that demonstration.

I would like to thank John Welch of Cabrillo College (Aptos, CA) for creating this demonstration and calling it to my attention.

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For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.