

Fluid Dynamics: Viscosity

Viscosity is a measurable physical property that tells us how much a liquid resists flowing. Measuring viscosity of liquids gives insight into materials and their behavior, and is a practice found in a wide variety of scientific and industrial fields. It's even important to understand in your home! Can you imagine how difficult it would be to keep frosting on top of a cake if it flows too easily? Knowing how to increase it's viscosity means you'll have an easier time baking!

Test is out!

1. Fill each cup, to the same level, with a different liquid.
2. Can you guess which liquid is more viscous than the next? See if you can arrange your cups from lowest viscosity (flows easily) to highest viscosity (resists flowing).
3. Test your guess! Drop a paper clip into each liquid, and observe how long the paperclip takes to sink to the bottom. The longer it takes to sink, the more viscous a liquid is.
4. With your observations, consider other liquid substances. Is honey more viscous than hair gel? What if the honey is cold or warm? Can viscosity change?
5. Can you think of reasons knowing the viscosity of a liquid might be important? Brainstorm with a partner!

Materials

- 5 transparent cups
- Liquid soap
- Water
- Syrup
- Cooking Oil
- Alcohol
- 10-15 paperclips

What's Happening?

Viscosity is a liquid's resistance to flowing. Liquids that have a low viscosity have a low resistance to flowing quickly. Examples might include water or rubbing alcohol. Liquids that have a high viscosity have a high resistance to flowing—like honey or molasses.

Viscosity depends on the *size and shape* of the particles that make the liquid, and the attraction between the particles. This means that viscosity is **NOT** the same as density. Density depends on how tightly packed the particles are to each other.

A great example comparing viscosity with density is oil and water. Oil is *less* dense than water (it floats on top of water) but *more* viscous than water. Oil resists flowing, where water flows more easily.

Pitch is so viscous that, in a 91 year experiment that is still happening, a small quantity hasn't finished flowing out of a funnel and into a glass!

