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Laboratory Experiment: Viscosity and Temperature

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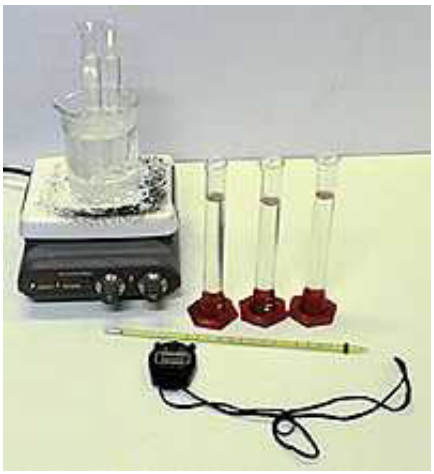
Not all liquids are the same. Some are thin and flow easily, while others are thick and gooey and flow very slowly. A liquid's resistance to flowing is called its viscosity.Honey and corn syrup are examples of liquids that are more viscous than water.

Viscosity is an important property of drilling fluids. The more viscous the fluid, the more easily it will suspend borehole cuttings and carry them up to the surface. On the other hand more pressure is needed to pump very viscous fluids. Also, with more viscous fluids, it is harder to wash off the cuttings.

The viscosity of most liquids is affected by temperature. To test this we experimented with corn syrup.



Tools and Materials

- One or more graduated cylinders
- A stopwatch that is accurate to 0.1 or 0.01 seconds
- 20 pebbles, all about the same size and shape, or 20 steel balls
- A thermometer
- Corn syrup
- A beaker filled with ice water
- A beaker filled with water at room temperature
- A hot plate or microwave oven, for heating the room temperature water
- A chart like the one below to record your results.

			Time in seconds			
Temperature	trial 1	trial 2	trial 3	trial 4	trial 5	average

What to Do

1. Fill a graduated cylinder with corn syrup.
2. Measure the temperature of the liquid and enter it in the "temperature" column on the first line of the chart.
3. Pick two marks on the scale of the graduated cylinder to use as reference points, for example 40 mL and 10 mL.
4. Drop a steel ball (or pebble) into the cylinder.
5. Click the stopwatch on when the ball passes the top mark (40 mL)
6. Click the stopwatch off when the ball passes the lower mark (10 mL)
7. Record your results on the chart
8. Repeat steps 4 through 7 until you have completed five drops.

Now change the temperature of the corn syrup by putting the cylinder of corn syrup in the beaker of ice water. When the temperature of the liquid drops close to freezing, do the experiment again. Next, warm the room temperature water on the hot plate or in the microwave. Put the cylinder of corn syrup in the warmed water. When the temperature of the corn syrup is notably above room temperature, perform the experiment.

Note: Be careful when heating the corn syrup. This should be done only with adult supervision. The liquid does not need to be very hot. Warming it to about 50°C (122°F) or 60°C (140°F) is fine.

Take a look at our results.

To find out about drilling fluids read Drilling Fluid: Lifeblood of the Well.

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Viscosity of Liquids

Different liquids have different properties. One of these properties is viscosity, the liquid's resistance to flowing. Water, milk, and fruit juice are comparatively thin and flow more easily than thicker, more viscous liquids such as honey, corn syrup, shampoo, or liquid soap.

Viscosity of Liquids II

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Viscosity and Temperature

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Properties of Liquids
