

How to measure viscosity using Elcometer Flow Cups

It is a common misconception that the viscosity of a liquid is a measure of how thick or thin it is. When measuring viscosity, what you are actually measuring is the resistance a fluid has to flow.

The viscosities of paints, varnishes, and oils for example; can be typically measured as part of a series of tests to ensure they are fit for purpose.

There are a number of ways to measure the viscosity of a liquid, one of which is flow cups.

A flow cup is a cup of a specified size and volume, with an overflow channel at the top, and a hole of a defined size in the bottom. And they are available in a range of designs in accordance with National and International Standards, with various orifice diameters to suit different viscosities.

To test, you will need a flow cup, a flow cup stand, a glass plate and bubble level, a stopwatch, a thermometer with a liquid probe, and a container of your sample liquid - ensuring there is enough of a sample to more than fill the flow cup.

But with many different designs available, which flow cup should you choose?

Well, if a preferred flow cup isn't listed on the technical data sheet of the liquid you are testing, then typically you should select a cup that will give an estimated flow time of between 30 and 100 seconds. However this is dependent on the range of the flow cup you are testing with, or the test method or standard you are working to.

You can click on the pop-out link in the top right of the screen, to view Elcometer's Flow Cups, along with their ranges.

Using a suitable solvent, ensure the cup and orifice are clean; as dirty equipment will affect the accuracy of the test. Do not use any abrasive cleaning tools, such as wire brushes or metal scrapers, as this will damage the cup, again resulting in inaccurate results.

Insert the flow cup into the stand, then ensure the cup is level. To do this, place the glass plate and bubble level on top of the cup, and adjust the feet of the flow cup stand until the bubble is centred.

Now, allow the temperature of the flow cup and sample liquid to stabilise at a uniform temperature. The temperature you test at will be dependent either on the test method or standard you are working to, the liquid you are testing, or on an agreed temperature by any interested parties.

If you are not testing in a temperature controlled environment, then Elcometer's double-walled thermo jacket can be used to control the temperature of both the cup and sample.

Before pouring your sample liquid into the cup, ensure it is free of air bubbles. Ideally, you should use a freshly strained sample.

Place a finger under the cup orifice to close it, and gently pour the liquid into the cup, avoiding the formation of any air bubbles. You should slightly overfill the cup, then slide the glass plate over the rim of the cup to push the excess sample into the overflow channel, ensuring your cup is completely full. Again, try to avoid the formation of air bubbles between the glass plate and the liquid.

Since your cup is completely filled with your sample, and should have no air in it, you can now remove your finger from the orifice, as your sample is held in place by the vacuum. Place a beaker, or any suitable container underneath the cup, and have the stopwatch at the ready.

Start the stopwatch at the same time as you slide off the glass plate, and watch the flow of liquid from the orifice.

The moment the flow of liquid breaks for the very first time, stop the stopwatch and record the result.

The measured kinematic viscosity is expressed in seconds, which can be converted into Centistokes using either a lookup table; available in the instruction book of your flow cup, or from the Elcometer website; or use the Elcometer 2400 Viscosity Disc. Simply find the cup you used on the wheel, move the hand to the flow time of your liquid, and the disc will tell you the result in Centistokes.

Alternatively you could use ElcoCalc, Elcometer's free app available from the Android or Apple App stores. Click the pop-out link in the top right to find out how to download.

ElcoCalc works out the viscosity in Centistokes for you. Again, just choose your cup type, enter the flow time, and ElcoCalc does the rest.

It's important to note, not all flow cups produce results that can be converted into Centistokes – in these cases the kinematic viscosity is recorded in seconds flow time.

If required to do so, test the sample again, and once all tests are complete, clean the flow cup and all equipment using a suitable solvent.

For more information on the Elcometer flow cups, click the pop-out in the top right of the screen, or simply visit Elcometer.com.

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