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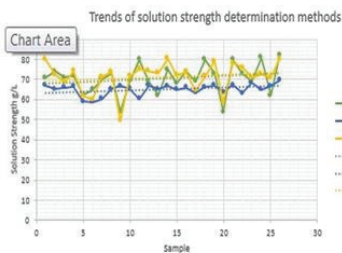
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## Hydrometer a step backwards

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# Hydrometer a step backwards

The hydrometer is being introduced to the wood treatment industry as the best method to determine the correct solution strength but several factors make the hydrometer less accurate than alternative methods.



Variations in readings, using the three methods.

The hydrometer is being promoted to our industry as the best method of determining the correct solution strength for your wood preservatives. Dolphin Bay believes that this is a step backwards from both of the other options on offer.

In fact, tests at our clients' plants have shown that this method is even less accurate than the titration method.

The hydrometer is a basic scientific instrument that is used to measure the density of liquids rapidly. It consists of a hollow, graduated glass tube which is floated within a cylinder or jar of liquid. The specific gravity or density of the liquid is determined by reading the scale on the hydrometer at the point at which it is level with the liquid.

The temperature of the liquid is also determined, in this case using a thermometer. The density and temperature are then read off a chart to determine the solution strength.

There are several factors which make the hydrometer less accurate than the alternative methods, says our industrial chemist Navintherin Moodley. Firstly, all hydrometers need to be calibrated before use. Calibration is done by precise measurements using distilled water. Using water with a high degree of dissolved solids and ions, including some borehole water and tap water in some areas of the country, could affect the solution's density, leading to incorrect readings.

Secondly, any difference in temperature between the solution in the treatment tank, and the water sample used in the hydrometer, could also affect the accuracy of the hydrometer reading.

Thirdly, the upward buoyant force that the liquid exerts on the hydrometer (explained by the Archimedes Principle) can vary according to factors such as height above sea level and changes in the gravitation acceleration due to altitude.

Hydrometers can be difficult to read due to the error of parallax and inaccurate observations of the meniscus.

Dirt, grease, wax and any other substance affecting the floatation of the hydrometer, will also lead to inaccurate readings.

Such variations in readings will have a big effect on measurements, as there are far fewer readings than the titration method, says Navi.

"Ideally, the hydrometer should be used when one wants to determine the approximate solution strength very quickly, but it should ideally not be trusted as the most accurate answer," he advises. "Chemical titration, also known as volumetric analysis, will return a much more accurate answer with less uncertainty. However, many of the potential errors of titrations can be taken care of by the use of the Securus Auto Titration unit."

Comparative tests at a client's plant showed that there was even greater variation using the hydrometer than the titration methods (see the green and yellow lines, respectively, on the accompanying graph). Securus AT (blue line) was vastly more accurate, and consistently so.

Says Bertus: "We're not against the hydrometer if it is used 100% accurately, but experience shows this is highly unlikely to be the case. Firstly, there is the problem of human error, which has affected many of our clients using the titration method. Navi's scientific explanation helps us understand why the hydrometer has even more room for error.

"We decided to offer Securus to our clients because it is based on the tried and tested wet titration method but is automated, which means that it produces consistently accurate readings, without depending on the operator to interpret the results. It also keeps records in PDF format, which can be filed and dated, so that you can review the accuracy of your treatment processes over time.

"Our advice to clients is to consider the options carefully before implementing a new system at your treatment plant," concludes Bertus.

Source : Dolphin Bay Chemicals (<http://www.forestry.co.za/dolphin-bay-chemicals/?cat=>)


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