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Water Content Determination

Objective:
To determine the natural water content of a give soil sample.

Applications of the test:
One of the applications of water content test is that it will allow us to find dry unit weight. Water content is also used in deriving phase relations.

Apparatus used:
2 containers (can#3 and can#5), electric oven, balance, desiccator

Test procedures:
1. Measure the weight of can # 3 and record it as \(W_1(g)\)
2. Add the soil in the can, measure its weight, and record it as \(W_2(g)\)
3. Place it in the electric oven at the temperature of 110\(^\circ\)C for 24 hours
4. Bring the can out of oven, and put it in desiccators for few minutes to cool down
5. Measure its weight, and record it as \(W_3(g)\)
6. Use the same steps for sample number 2

Analysis of test results:

<table>
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<th>S. No.</th>
<th>Sample No.</th>
<th>1</th>
<th>2</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Can No:</td>
<td>#3</td>
<td>#5</td>
</tr>
<tr>
<td>2</td>
<td>Weight of can, (W_1(g))</td>
<td>28.40</td>
<td>33.40</td>
</tr>
<tr>
<td>3</td>
<td>Weight of can + wet soil (W_2(g))</td>
<td>83.40</td>
<td>85.00</td>
</tr>
<tr>
<td>4</td>
<td>Weight of can + dry soil (W_3(g))</td>
<td>73.80</td>
<td>76.00</td>
</tr>
<tr>
<td>5</td>
<td>Water/moisture content (W(%)=[(W_2 - W_3)/(W_3 - W_1)]\times100)</td>
<td>21.15%</td>
<td>21.13%</td>
</tr>
</tbody>
</table>
Sample Calculations:

Can #3:

\[ W(\%) = \left[ \frac{(W_2 - W_3)}{(W_3 - W_1)} \right] \times 100 \]

\[ W(\%) = \left[ \frac{(83.40 - 73.80)}{(73.80 - 28.40)} \right] \times 100 \]

\[ W(\%) = 21.15\% \]

Can #5:

\[ W(\%) = \left[ \frac{(W_2 - W_3)}{(W_3 - W_1)} \right] \times 100 \]

\[ W(\%) = \left[ \frac{(85.00 - 76.00)}{(76.00 - 33.40)} \right] \times 100 \]

\[ W(\%) = 21.13\% \]

Average = \( \frac{21.15 + 21.13}{2} = 21.14\% \)

The natural moisture content of the soil sample is = \textbf{21.14\%}


Mean, \( \mu = \frac{\sum X_i}{n} = \frac{17.4 + 21.13 + 22.33 + 21.49 + 21.49 + 21.15 + 21.13}{7} = 20.87\% \)

Standard deviation, \( \sigma = \sqrt{\frac{\sum (X_i - \mu)^2}{n - 1}} = 1.589 \)

Coefficient of Variation, \( \text{COV} = \frac{\sigma}{\mu} = 0.076 = 7.6\% \)

Summary and conclusion:

The average water content of the given soil sample is \textbf{21.14\%}. The class average is found to be \textbf{20.87\%} with a standard deviation of \textbf{1.6} and a COV of \textbf{7.6\%}.

Comments/Remarks/Observations:

Your comments and observations here…