

Effect of Sample Size on Water Activity Measurements Using the AquaLab Series 3TE

Objective : to study the effect of **food sample size** (“one layer” versus “1/2 cup”) on water activity determination with the AquaLab 3TE series.

Materials : food materials were put in the sample cup (“one layer” or ½ cup”), covered and sealed with plastic tape. All samples were thermally equilibrated at 25 °C in the thermal Equilibration Plate, before water activity determination.

Determination of water activity : AquaLab 3TE series, set at 25 °C, was used ; all determinations were made by triplicate (after thermal equilibration at 25 °C) and the average is reported.

Table 1 shows the amount of food (approximately) which completely covers the bottom of the cup (“one layer”) and to fill the sample cup to half full (“1/2 cup”); the moisture content of the food (determined gravimetrically) is also indicated.

Table 2 compares the measured “water activity” using “one layer” or “1/2 cup” filling of the sample cup. (reported a_w values are the average of triplicate determinations)

Food Product	“one layer” (g)	“1/2 cup” (g)	Moisture content (%)
Milk powder, whole	1.0	2.4	3.3
Vegetable dry soup	0.86	2.3	4.2
Isolated soybean protein	0.60	2.0	8.7
Wheat flour	1.0	3.7	11.7
Corn starch	1.0	2.4	11.7
Honey	2.2	8.3	16.1
Tomato ketchup	2.0	6.3	54.0
Soybean sauce	1.4	4.6	67.1

Food product	“ a_w ”, one layer	“ a_w ”, 1/2 cup	Total moisture in “one layer” sample, grams (rounded)
Milk powder, whole	0.358	0.306	0.034
Vegetable dry soup	0.327	0.278	0.036
Isolated soybean protein	0.569	0.558	0.052
Corn starch	0.605	0.601	0.12
Wheat flour	0.596	0.598	0.12
Honey	0.545	0.544	0.35
Soybean sauce	0.917	0.919	0.94
Tomato ketchup	0.936	0.937	1.1

Decagon recommends that the food sample **must completely covers the bottom** of the cup, if possible; also, not fill the sample cup more than half full is recommended.

The results shown on Table 2 indicate that the measured water activity is significantly different between “one layer” or “1/2 cup” samples for foods of relatively low moisture content, such as milk powder, vegetable dry soup and isolated soybean protein. It can be seen that samples which contain less amount of total moisture in the sample cup, (combination of low moisture content and mass of sample in “one layer”) show a discrepancy in measured water activity values. Other samples show a good agreement.

Conclusion

Should it be recommended that food samples of relatively low moisture content (and also low bulk density) be filled in the cup to more than enough to completely cover the bottom