



Water Activity, The Basics

Helping you make a better measurement.

Webinar Presenters



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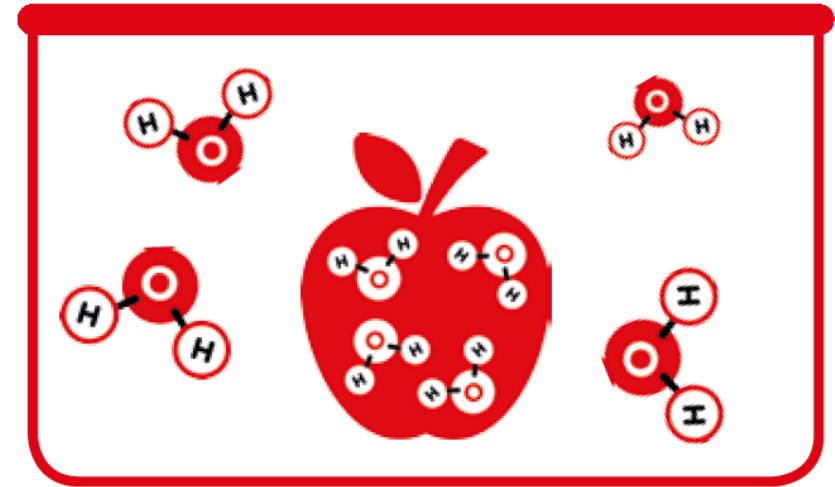
Agenda

1. What is Water Activity
2. How does Water Activity relate to Moisture Content?
3. Why should you measure it?
4. How to measure it?

What is Water Activity (A_w)?

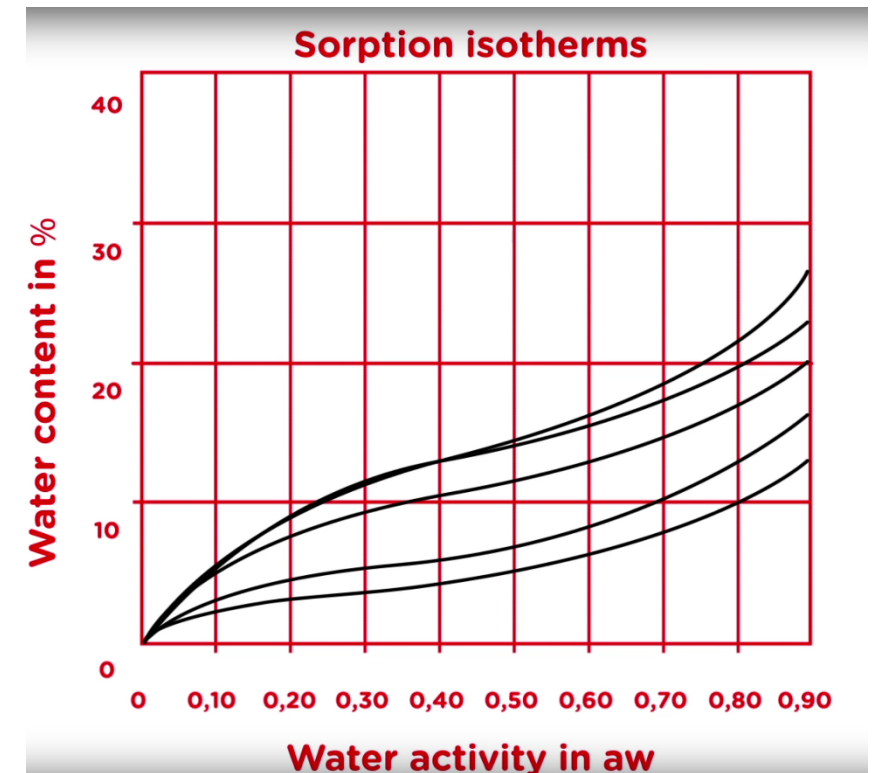
- Water activity is defined as the free or non-chemically bound water in foods, pharmaceutical, cosmetics and other products.

$$p/p_s$$



Water Activity & Moisture Content

- What is Moisture Content?
 - Moisture content is the percentage of water by weight in the product compared to the dry or wet weight of the product and includes both the bound water plus the free water. Moisture content is often confused with the water activity.



Why Measure Water Activity?

Product Quality

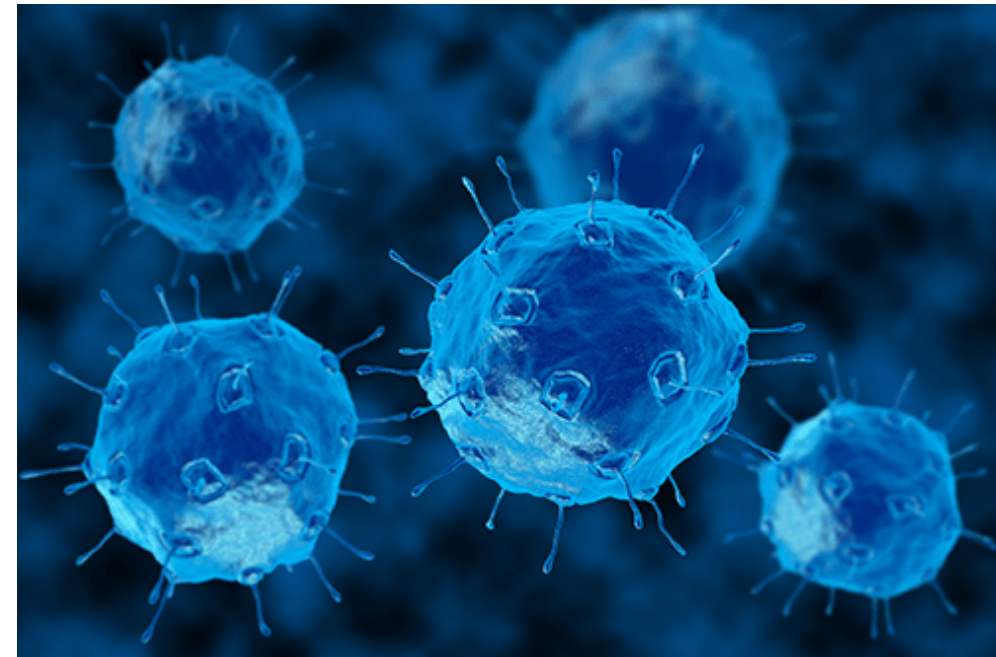
- Texture
- Taste
- Color
- Nutritional value
- Shelf life
- Safety



Why Measure Water Activity?

Microorganisms

Water Activity	Contaminant
$A_w = 0.91 \dots 0.95$	Many bacteria
$A_w = 0.88$	Many yeasts
$A_w = 0.80$	Many mildews
$A_w = 0.75$	Halophile bacteria
$A_w = 0.70$	Osmiophile yeasts
$A_w = 0.65$	Xerophile mildew



Sample Application - Food

Aw of some common foods:

- Liver Pate: 0.96 Red Bean
- Paste: 0.93
- Fudge Sauce: 0.83
- Soy Sauce: 0.80
- Soft Moist Pet Food: 0.83
- Caviar: 0.92
- Salami: 0.82



Sample Application - Pharmaceutical

- ICH Q6A Decision Tree 6
- USP 1112
 - Improving antimicrobial effectiveness of preservative systems
 - Improving shelf life
 - Reduced risk of microbial contamination
 - Rational for screening frequency



Other Real World Applications

- Cohesion and flow properties of hygroscopic powders
- Adherence of coatings
- Control of caking and compaction properties
- Dimensional stability of materials such as paper
- Tensile strength and elastic recovery
- Yield pressure and compaction



Comments & Questions



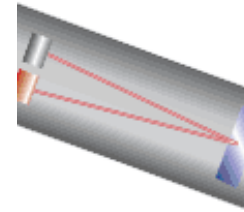
Please type your questions into the chat box at the lower left portion of your screen.



How to Measure Water Activity

Sensor Technology

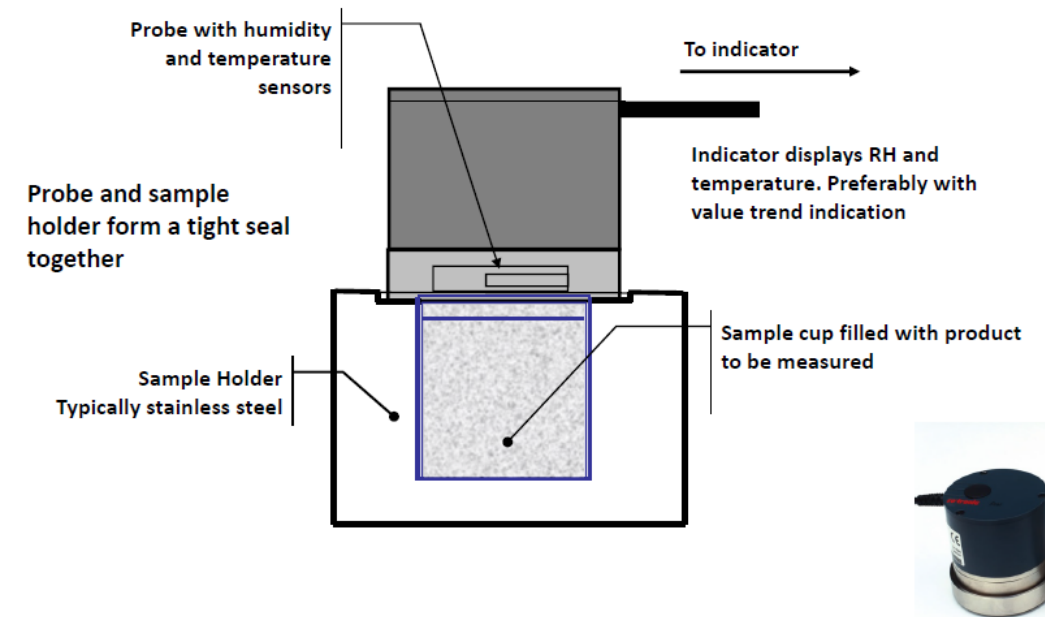
- Capacitive Sensors
- Resistive – Electrolytic
- Chilled Mirror
- Laser Technologies



Basics of Measurement

- Equilibrium Relative Humidity equates to A_w
- Temperature equilibrium is critical
- Sample preparation and consistency are critically important
- 5 – 45 minutes for one measurement
- Calibration of sensors is important

$$p/p_s$$



Sample Preparation

- Consistent procedures
- Representative samples
- Not too much and not too little
- Consider how coatings may affect readings
- Limit handling and exposure of the product
- Ensure temperature equilibrium
- Be aware of contamination



Summary & Takeaways

1. Water Activity (A_w) & Moisture Content – different but you can correlate
2. A_w is an excellent indicator of quality, shelf life, safety
3. Sample preparation and consistent process make the difference

Comments & Questions



If we don't get to your question today, we'll respond via email after the webinar.

Next Webinars

How to Read a Psychrometric Chart

- **Date:** Wednesday, April 4, 2018
Time: 1:00 - 2:00 PM EDT

The Fundamentals of Measuring Carbon Dioxide

- **Date:** Thursday, May 3, 2018
Time: 1:00 - 2:00 PM EDT

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