NOVATRON SCIENTIFIC
A division of Rhopoint Metrology

RHOPOINT METROLOGY

Water Activity & ERH% Precision Instruments

The LabMaster-aW neo

- Reduce cost and wastage
- Absolute confidence
- Maintain high product quality
- Maintain product shelf life & safety

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novasina
The Art of Precision Measurement

What is water activity?

Water activity (also known as 'aW' or ERH%) specifies the unbound water available in your product. It's an important measurement to determine product quality and safety, especially microbial stability.

Water activity is the measurement of the equilibrium relative humidity of a material, that is the humidity that a hygroscopic material generates when it comes into balance with the air surrounding it in a sealed headspace. This "Available Water" is the unbound water able to come and go from a material by adsorption / desorption.

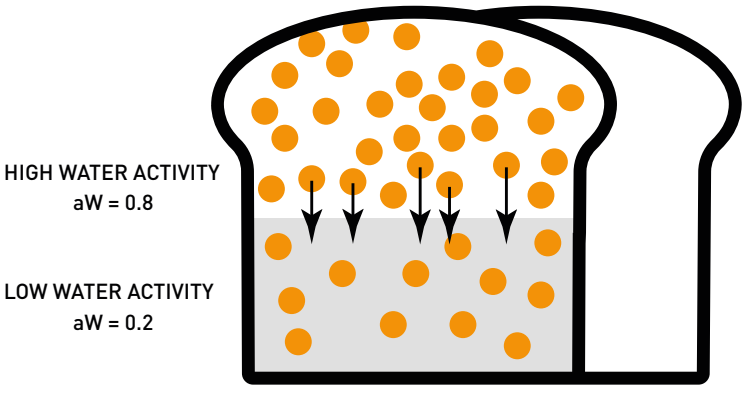
The water activity of the sample is equal to the relative humidity of air surrounding the sample in a sealed measurement chamber, normally at controlled temperature 25°C.

Water Activity can be expressed as either: –
Equilibrium relative humidity (erh) scaled 0-100% erh units
or
Water activity (aW) scaled 0-1 aW units. Most microbiologists tend to use aW units.

Air relative humidity is influenced by temperature so it follows that equilibrium relative humidity (water activity) will be too. The higher the aW value, the greater the influence of temperature on the stability of water activity.

For most samples, temperature control of 25°C is essential above 0.85 aW units.

The aW value of a product may be critical to ensure microbial stability and safety, it may even be a legal parameter, often measured as part of Critical Control Point (CCP) validation, monitoring or verification. Water activity can be used for microbiological growth control, shelf-life, the stability of product composition (moisture migration), general product quality (texture, taste, potency & colour) .



Free water moving to a low aW area

The higher the aW value, the greater the influence of temperature on the stability of water activity.

Why measure water activity?

Water activity measurement is important to maintain high product quality safety and shelf life. By measuring water activity, it is easier to predict which microorganisms will be possible sources of spoilage.

Measuring water activity makes it possible to control and improve the manufacturing process to ensure mechanical, physical, chemical and microbiological stability. The measurement of water activity is critical for the quality and health safety of a product.

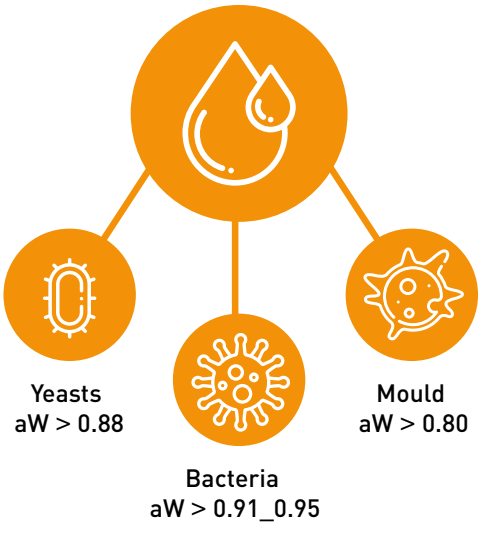
Water activity shows the amount of water which is available to microorganisms for reproduction. Each type has a minimum water activity value. Below this aW value, the growth of that species isn't possible.

Water activity influences:

- **Texture abnormalities**
- **Flavour abnormalities**
- **Microbiological stability**
- **Protein and vitamin content**
- **Chemical stability**
- **Enzymatic stability**
- **Water migration**
- **Enzymatic reactions**
- **Browning reactions**
- **Oxidation reactions**
- **Powder caking**
- **Shelf life**
- **Storage**
- **Packaging**

Water activity value	Type of Microorganism
aW = 0.91...0.95	Most bacteria
aW = 0.88	Most yeasts
aW = 0.80	Mildew
aW = 0.75	Halophile bacteria
aW = 0.70	Osmiophile yeasts
aW = 0.65	Xerophile mildew
aW = 0.6	Most moulds

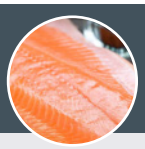
Water activity has a direct impact on growths of moulds, yeast and bacteria.



Left: Simple traceable calibration with RFID re-useable salt capsules. By swiping the salt over the chip reader, the calibration is automatically started.

Applications

Water activity is measured in a wide range of industries including;



Food

Meat & sausages, cheese, grains, flours

- Texture abnormalities
- Flavour abnormalities
- Microbiological stability
- Protein and vitamin content
- Shelf life
- Storage
- Packaging
- Browning reactions

Pharmaceutical

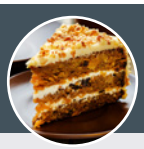
Pills, liquid medicines

- Microbiological stability
- Chemical stability
- Enzymatic stability
- Water migration
- Oxidation reactions
- Powder caking
- Shelf life
- Storage
- Packaging

Confectionery

Sweets, chocolates

- Texture abnormalities
- Flavour abnormalities
- Shelf life
- Storage
- Packaging



Bakery

Breads, cakes, pastries

- Texture abnormalities
- Flavour abnormalities
- Microbiological stability
- Water migration
- Shelf life
- Storage
- Packaging

Cosmetics

Eye shadow, lipstick, foundation

- Oxidation reactions
- Powder caking
- Shelf life
- Chemical stability
- Enzymatic stability

Hygiene

Shower gel, liquid soap

- Chemical stability
- Enzymatic stability
- Shelf life
- Storage
- Packaging

Petrochemical

High ethanol, drilling muds and fluids

- Chemical stability
- Enzymatic stability
- Oxidation reactions
- Shelf life
- Storage
- Packaging

Tobacco

Cigars, cigarettes, rolling tobacco

- Flavour abnormalities
- Water migration
- Shelf life
- Storage
- Packaging

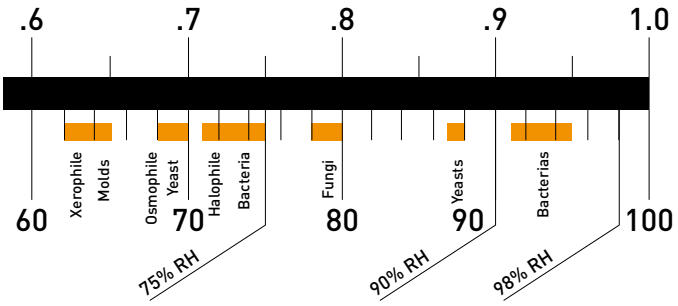
The LabMaster-aW neo is suitable for process / quality control on the production line or laboratory analysis and product development.

Case study

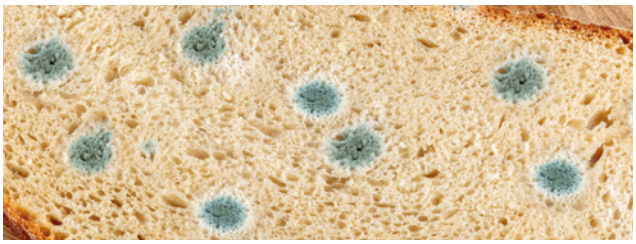
Water activity is measured in a wide range of industries and also at various stages of production and packaging.

CASE STUDY: BAKERY PRODUCTS

Water activity and ERH%
Water activity, or equilibrium relative humidity (ERH%), is widely used as a quality control measure in bakery products to predict mould-free shelf life and the stability of composite products like layer cakes or filled croissants.



Mould growth prevention
Mould-free shelf life may be determined by using the water activity value in combination with other factors such as pH and preservative environments created within packaging. Mould may begin at water activity of 0.6 aW upwards, but below this level products are generally free from mould-growth.



New easy change sensor protective filter with magnetic tool – quick and longer lasting filter with 4 months change interval.

The LabMaster-aW neo

The LabMaster-aW neo is a high precision water activity meter that is the ideal choice for routine determination of water activity with sample temperature control, where absolute confidence in reading is essential.

The LabMaster-aW neo is able to detect unbound water vapour quickly and accurately. It is the only instrument that enables measurements under precisely controlled chamber temperature conditions, selectable in the range of: 0°C to 60°C, with a precision of 0.2°C.

The LabMaster-aW neo is also suitable to support further investigation to find the source of product spoilage, texture failures or rancidity. Unique features are: ISO 18787 test mode and full audit trail ability.

Fully compliant with ISO 18787: 2017 water activity testing standard

Benefits	
Proven measuring technology with unique Novasina sensor system	✓
New touch-screen intuitive operation with in-built operating guide on-screen	✓
Measuring range 0.03 to 1.0 aW and 0 – 60°C with accuracy 0.003 aW	✓
Quick mode for sample tests in under 10 minutes	✓
Fully 21 CFR11 compliant audit trail compliant with data inegrity	✓
Resolution 0.0001 aW with stability detection time 0.0003 aW over 1 minute	✓
Re-useable, factory–safe UKAS calibration salts with RFID chip for identification	✓
Highly resilient to non-aqueos volatiles used as additives and preservatives	✓
Import/export SD card and internal memory holding complete user history	✓
On site service, calibration, IQ/OQ, fully ISO9001 and UKAS 17025 accredited company	✓

The LabMaster-aW neo features

Sensor

Unique Novasina CM2 precision sensor system; resilient to volatiles, fast response within 10 mins.

Large thermo-controlled sample chamber

w40mm x h13mm and a volume of 12ml.
Large capacity to test a range of products.

Touch screen

New touch-screen intuitive operation with in-built operating guide on-screen.

Calibration salt RFID chip reader

Resistant and durable

Made from steel to be strong and durable.

Portable

Easy to move in the laboratory or production line

Stand-alone instrument

Small footprint reduces space required in laboratory

Dual measurement

Humidity equilibrium detection.

View LabMaster-aW neo online

Specifications

LabMaster-aW neo instrument	
Size	L = 423, W = 260, H = 186mm. Height with opened cover = 462mm
Weight	10 kg
Mains supply	90V...260V, 50/60Hz, wide range power supply
Weight	10 kg
Operational Conditions	• Rel. Air Humidity: 5.....95%rH, non-condensing • Temperature: 5....45°C • Altitude: up to 2'000 metres above sea level (m a.s.l.) according to EN 61010-1
Power Supply	• 100.....260 VAC • Power consumption: - Maximum: 42W - Normal Operation: <15W - Stand-By: <0.1W
Display	7'' capacitive touch screen
Communication	• RS-232 and USB 2.0 for PC / • RS-232 for Epson printer TM-U220D • SD-Card
Housing	Hybrid painted steel housing/PUR
Volume measurement chamber	12mL
Dimensions Sample Cup	Diameter 40mm x Height 13mm
Protection Class	IP20
21CFR 11	• 21CFR11 compliant Audit Trail • 21CFR11 compliant User Management

Measurement Specifications	Parameter-Water Activity	Parameter-Temperature
Measurement Principle	Resistive Electrolytic	Surface Infra-red
Measurement Range	0.0300.....1.0000aW*	0...60.00°C (32...140°F)
Calibration Range	0.0400.....1.0000aW*	N/A
Resolution	0.0001aW	0.01°C
Accuracy	+/-0.0030aW within cal. range	+/-0.10°C
Precision	+/-0.0020aW within cal. range	+/-0.10°C
Repeatability (typically)	+/-0.0010aW within cal. range	N/A
Temperature Control	Programmable measurement temperature in the range of 0.....60.00°C (32.....140°F)	
Calibration Points (%rH)	4%, 6%, 11%, 33%, 53%, 58%, 75%, 84%, 90%, 97%, 100% Salt standards equipped with RFID tag for faultless identification	

Replacement calibration salts

- Multiple, unlimited use, typically a 5 year life span
- Annual recalibration to ISO 17025 available
- Simple to use and store
- Fully re-useable with re-sealing containers
- A full range of humidity values from 4% up to 97% humidity
- Calibration uncertainty typically +/- 1.7 % RH
- Health & safety (COSHH) material data sheets available with all calibration salts

Available with or without UKAS calibration.

Purchase calibration salts online

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