Water activity

LabTouch-aw

Laboratory instrument for accurate water activity (aw) measurement

Quality

Product safety

Microbiological stability

novasina
The Art of Precision Measurement

www.novasina.com

„All life needs water!“
There is no life without water!

„***Water means life!***“ Thanks to water, life has developed and new life continues to develop.

„***Life needs water***“. Water is the „elixir of life“ for animals, humans and plants. But bacteria, fungi and viruses also need water to live. Water is stored in every product. Either in the form of a chemical compound with other molecules or as free water, which is stored between the compounds. What is the optimum amount of both types of water now? The amount of bound water is depending on the chemical reactivity of the substances used.
Free water can be affected by production processes as well as via storage and packing. Alongside the usage of water, too much free water can particularly damage the product. Microorganisms such as fungi or bacteria can optimally grow and thrive on this surface. Their metabolic products are deposited on the product and spoil the quality. Too high water activity means limited durability. Water activity values, which are too low can spoil the taste or appearance.

Only an extremely accurate and safe quality measurement of water activity („free water components“) guarantees quality products!

Air and water
the important elements on earth for any life

Meaning of „water activity“ (a_w)

Water (H2O) is an important basic element in foods as well as in many pharmaceutical and cosmetic materials and products. For a long time the industry has known how important it is to check free water. The water activity (aw) measurement forms the basis of this and provides important information about the quality of a product. Finally it provides information regarding the possibility of microbiological growth on the surface and then conclusions can be made about the stability and durability of a sample.

Water activity is defined as the degree of availability of free water in a sample. Only this component takes an active part in the exchange with the ambient humidity and can possibly form the ideal medium for microbiological growth on the surface. Above the sample, the humidity is measured immediately after reaching the humidity equilibrium.
The relative humidity is measured in % RH and converted in aw electronically.

0...100% RH corresponds to 0.00...1.00 aw

Free water in products is jointly responsible for the growth of undesirable organisms such as bacteria or fungi, which produce toxins or other harmful substances. But also chemical/ biochemical reactions (*e.g. the Maillard reaction*) increasingly take place and possibly change the product's

colour, taste, shape, texture and appearance.

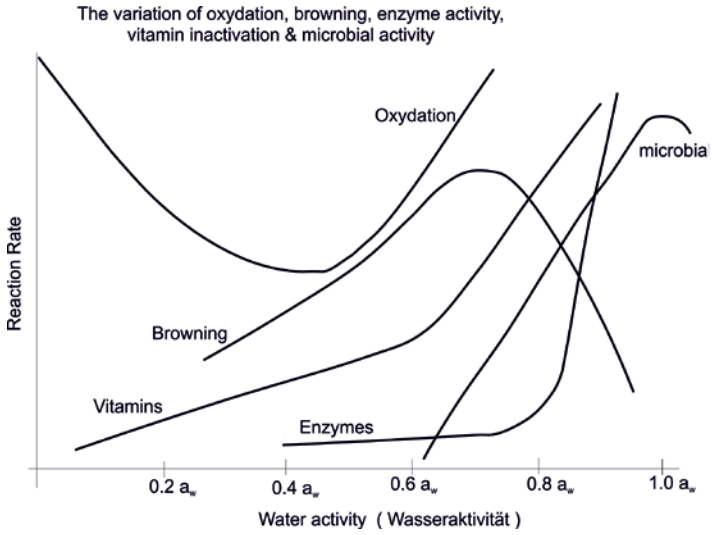
Introduction to aw measuring

In the food, pharmaceutical and cosmetic industry, water activity (aw value) is understood as the humidity balance (equilibrium) value of a product, which is ascertained through its partial vapour pressure of water vapour on the surface. This is depending on the following factors:

- Chemical compound
- Temperature
- Water content
- Storage environment (T / RH)
- Absolute pressure
- Packing

Above factors affect also the following properties:

- Microbiological stability *(growth)*
- Chemical stability *(see table)*
- Content of proteins and vitamins
- Colour, taste and nutritional value
- Stability of the compound & durability
- Storage and packing
- Solubility and texture



The optimisation and stabilisation of the product properties require an **upper** as well as **lower** aw value limit. Therefore, constant supervision of this quality parameter is essential and necessary for efficient production.

There are binding regulations regarding to the aw value to be met in foods. The measuring principle applied by Novasina was checked by the FDA, UNO, WTO, FAO, AOAC and FOS (EFSA) and found to be suitable.

Novasina, the market-leading provider of accurate water activity measuring instruments

LabTouch-aw

Enter the world of water activity! For over 50 years Novasina has been developing globally recognised and accurate water activity measuring instruments for quality and research laboratories. The unique measuring technology is based on an electrolytic aw value measurement as well as on simple operability and sample conditioning. These are the key factors for correct and repeatable measurements. Thanks to new functions, the effective measuring accuracy and reproducibility could be improved and the scope of applications extended. Most different types of foods, as well as many pharmaceutical, chemical and cosmetic products can be checked with the new *Lab*Touch-aw system

LabTouch-aw with touch screen interface

Due to the use of filter systems to protect the measuring sensor, today even samples with non-aqueous additives such as alcohol, acids/bases or chlorine etc. can be measured efficiently and accurately. Such filter systems do not generally affect the measuring of the water activity. The LabTouch-aw system ideally uses the highest physically possible measuring speed. Thanks to modular expandability and pre-conditioning, a higher number of samples can also be measured quickly and accurately.

The new *Lab*Touch-aw with its simple and clear operation by touchscreen sets a new standard for aw laboratory measuring devices. Thanks to modular construction, the system can be expanded by up to 2 additional measuring chambers. Its unique hardware and software architecture enables highly accurate, reproducible measuring results over a wide measuring range. As a result, all recommendations and regulations of authorities/control boards such as HACCP, AOAC, FDA etc. can be met. Each *Lab*Touch-aw is equipped with a SD-card which can be used for data transfer to Windows-based PC systems. For data and sample visualisation, analysis and archiving, Novasina offers a tested PC software.

The *Lab*Touch-aw comes with a semi-temperature controlled measurement chamber. Its function premise is that the measurement temperature has to be always 2°C above room temperature.
The measurement of the water activity is based on a resistive electrolytic humidity measurement („Novalyte“ technology) which is one of Novasina's core strengths. The advantages are quite simple but essential:

No hysteresis, high accuracy and repeatability.

Various chemical filters are available to protect the sensor system from volatiles as alcohol, glycol, glycerine and many more. The use of filters guarantees an unaffected aw measurement and avoids a sensor contamination and thus extends its shelf-life.

Your advantages:

- Easy accessible menus by **large touch-screen**
- Semi-temperature-stabilised measurement chamber
- **Re-usable SAL-T humidity standards** and long-life sensor for economy
- Fast and precise aw-measurement thanks to the unique „Novalyte“ measurement technology
- Specific chemical sensor **protection filters** available
- Calibration data are stored on the sensor (no calibration required after sensor replacement))
- Data logging function with SD card
- Factory calibration at 7 aW-value points
- Checking, testing and adjusting possibilities with reusable SAL-T humidity standards
- Visualisation and analysis software „Novalog MC“

The ***Lab*Touch / Click-aw** product range

*Lab*Click-aw No.1

*Lab*Touch-aw

*Lab*Click-aw No.2

With the ***Lab*Touch-aw** measuring instrument you acquire a long-lasting laboratory device, which is upgradeable at all times thanks to its advanced technology. Extra ***Lab*Click-aw**'s can simply and easily be attached to a ***Lab*Touch-aw advanced** as additional measuring units. A ***Lab*Touch-aw** manages and operates up to 2 ***Lab*Click-aw** using just one cable per chamber. As a result, it is possible to measure up to 3 samples simultaneously. The intelligent network independently recognises a new chamber and correspondingly lintegrates it in the network.

An SD-card is used for long-term storage and management of all measuring data which can be read-out by using a standard PC and Novasina's Novalog MC software.

The software of each ***Lab*Touch/Click-aw** can be updated using the SD-card on which you can put the downloaded update files. This way, the instrument can be kept up to date at any time.

If necessary, the sensing unit can be replaced quickly and easily by the user. Every factory-delivered sensor comes with a factory calibration at all points which are stored on a small memory on the sensor-board itself. This allows the user to mount the sensor and start measuring without performing a calibration.

Verification and calibration of the meter is done by re-useable Novasina humidity standards. These are easy to handle, offer great long-term stability and generate reproducible aw values. A set of 4 aw standards is included in each ***Lab*Touch-aw** delivery. The SAL-T standards do not contain a due date as shelf-life mostly depends on their handling and storage. Field data have proven a shelf-life of 3-5 years

---

Specifications *Lab*Touch / *Lab*Click-aw system		
	***Lab*Touch-aw**	***Lab*Click-aw**
Measuring Principle aw Measuring Principle temperature	Resistive electrolytic air humidity measurement Surface infrared measurement + NTC element	
Measuring Range aw *(full)* Measuring Range temperature	0.03 ..... 1.00 aw 5....45 °C (41.....113°F)	
Accuracy aw *(Range)* Accuracy temperature *(Range)*	+/- 0.005 aw (0.10 ... 0.97 aw) +/- 0.15 °K (5 ... +45°C)	+/- 0.010 aw (0.10 .... 0.95 aw) +/- 0.15 °K (5 ... +45°C)
Resolution aw / temperature	0.001 aw / 0.1°C	0.001 aw / 0.1°C
Accuracy of temperature control	+/- 0.05°C Semi-temperature control, programmed temperature must be always +2°C above environmental temperature!	No temperature control
Mains supply *(instrument)*	5 VDC +/- 6%, max. power requirement : 10 W	Power supplied by *Lab*Touch-aw
Power supply *(external)*	90....264 VAC 50 / 60 Hz, output -> +5 VDC	Power supplied by *Lab*Touch-aw
Display	4.3" resistive touch-screen *(color LC display)*	Reflective LC-display with adjustable contrast
Communication	SD card /type: SD / SD data system: FAT-16 / FAT-32	N/A
Housing	Two-part PC/ABS design housing measurement chamber aluminium anodised	
Weight	2.8 kgs	1.2 kgs
Protection Class / Dimensions	IP 22 / Dimensions approx. : 300 x 200 x 105 mm	IP 30 / Dimensions approx. 225 x 140 x 85 mm
Volume Measurement Head	21.1 mL, standardised sample dishes	
Dimension Measuring Chamber	40 x 12 mm	
Sealing Measurement Chamber	Spring loaded measurement head plus lip seal	

novasina
The Art of Precision Measurement

a_w value measurement method

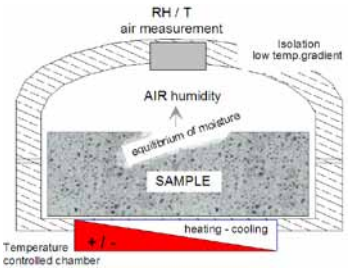
The test sample is placed in a completely **sealed** and **temperature-stabilised measuring chamber**. After closing the chamber, the sample humidifies or dehumidifies the surrounding air volume inside the chamber by exchanging **free water** from the sample and humidity from the air. At a certain point, the mass flow of water in each direction is constant, means, equilibrium is reached. At this point, the air humidity is linked to water activity, thus an air humidity measurement can be used to determine the water acitvity of the sample. State-of-the-art instruments are monitoring the status of this equilibrium and are notifying the user once it is reached. The following factors play an important role in the measuring accuracy and speed:

- Temperature of the sample and measuring chamber is measured
- Equilibrium detection mode
- Sealing of the measuring chamber
- Sample preparation
- Measurement accuracy of the air humidity sensor

The measuring speed largely depends on the sample properties and stability of environmental conditions, mainly temperature.

Intramolecular effects as van der Waals forces slow down the diffusion or inhibit the free water to move towards the surface and interact with the air in the chamber. As a consequence, special attention is given once high carbohydrate or protein content is available in the sample.
Fat is another story. Once a sample is covered with a fat layer, no free water can pass through, thus the displayed aw value might be wrong. The solution here is the sample preparation by breaking through the fat layer (mainly cutting or mixing of sample)

To exclude external influences, mainly temperature, a temperature controlled chamber is a prerequisite, otherwise, nobody knows if the shift in aw value comes from the sample or the temperature.



Food industry

Testing of products and raw materials to optimise durability, colour, taste, nutritional value and processing. Final inspection, quality assurance as well as packing optimisation regarding durability. Optimising process and energy costs during production.

Quality controls in accordance with HCCP WHO, FDA, AOAC

Typical measuring samples

- Meat, fish, poultry
- Fruit, berries, fruit additives,
- Bread, cakes and pastries, jam, biscuits
- Dried sausage, nuts
- Butter, yoghurt, quark, cheese
- Chocolate, cocoa, chocolate bars, sweets
- Pasta products, rice, cereals
- Spices, dried soups
- Stock cubes, yeast

Pharmaceutical industry

Tests of basic materials, semi-finished and finished products for process properties and possible reactivities. Checking further process abilities in the subsequent process levels. Checking product properties regarding the intake and release of free water into the environment.

Quality controls in accordance with HCCP, SOP, FDA, SOP

Typical measuring samples

- Different powders
- Granules
- Tablets, coated tablets
- Gels, creams
- Various liquid materials
- Specific drugs

Cosmetic industry

Quality assurance of basic materials, semi-finished and finished products. Optimising durability, colour, fragrance as well as taste and processing. Optimising packing regarding durability and presentation.

Quality controls in accordance with HCCP, WHO, FDA, SOP

Typical measuring samples

- Powders
- Creams and gels
- Cosmetics
- Colours
- Conditioning creams

Some well known companies who associate quality with Novasina:

novozymes, NOVARTIS, SCHWARZ PHARMA, Kellogg's, Barilla, Philip Morris Companies Inc, DANONE, Boehringer Ingelheim, Lilly, BESTFOODS, Unilever, Dawn, Nestlé, DAN CAKE, mepha, KIKKOMAN, Daiichi-Sankyo, gsk GlaxoSmithKline, DOW, Lindt OF SWITZERLAND, WAGENINGEN UNIVERSITEIT, CHEMIFARM s.r.l., Aventis, MERCK, Pfizer, Malbuner, harrys, AstraZeneca INTERNATIONAL, BRITISH SUGAR, DSM, ROYAL CANIN

Novasina – Swiss quality, flexibility and competence

Since its establishment almost 50 years ago, the Novasina company has specialised in the **accurate measuring** of **air** and **material humidity**. The basis of this was the world's first, self-developed electronic measuring sensor for measuring humidity. This technology is based on the resistive electrolytic measurement principle. This was further developed and optimised over decades. This measuring principle is generally the most demanding and most accurate. Modern substances and materials allow continuous optimisation and expansion of the area of application of this measuring sensor. Today the highly accurate humidity measurement is among our core competences and forms an important pillar of our success. Intensive research and development further ensures a decisive advantage for us. **Novasina** sensors and measuring instruments are mainly applied to the area of air and material humidity. This is almost exclusively used in industrial applications as well as in research and development.

We fully develop and produce Novasina precision measuring instruments in which our Know-how of many years is always included. We are proud of the **„SWISS MADE"** label, which guarantees the highest quality, innovation and longevity.

The diversity of our customers, business partners and applications as well as our international orientation makes Novasina the competent partner for demanding humidity measurements in the industrial sphere!

Customer uses and innovation always come first with Novasina!

For further technical information, see the technical data sheets:

Manufacturer :

Novasina AG
Neuheimstrasse 12
CH - 8853 Lachen SZ
Switzerland

Phone : +41/ (0)55-642-67-67
Fax : +41/ (0)55-642-67-70
E- Mail : info@novasina.ch
Internet : www.novasina.com

CE

Consultation, sales and services:

Subject to technical changes

Dok. Nr. 004321.00