

# AquaLab Water Activity Instrumentation



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# Dew Point Water Activity



Use AquaLab 4TE to get lab quality water activity measurements at the line, receiving dock, processing plant, storage facility—anywhere you need to verify the safety and quality of your products and ingredients.

#### How it Works

Put a 7.5 ml product sample in a disposable cup, seal the sample chamber lid over the sample, and wait for vapor equilibrium.

An infrared beam focused on a tiny mirror determines the precise dewpoint temperature of the sample. That dewpoint temperature is then translated into water activity.

#### Easy to Clean

The sample chamber lid lifts up allowing easy access to clean sensors.

#### Secure Data

The 4TE stores up to 8,000 secure data points including time and date for up to 25 unique users with every measurement and calibration.

#### Easy to Use

AquaLab 4TE makes water activity measurements quick, accurate, and simple. Using AquaLab, anyone, from a researcher in the lab to an operator at the line, can measure water activity in 5 minutes or less to 0.003 aw specifications.

Scan the QR code with your smart phone to read more about the AquaLab 4TE on our website.



## AQUALAB 4TE SPECIFICATIONS

### Sensor Types

- Chilled-mirror dewpoint
- Infrared temperature

Accuracy  $\pm 0.003$  aw

Repeatability  $\pm 0.001$  aw

Resolution  $\pm 0.0001$  aw

Range 0.030 to 1.000 aw

Measurement Time

Less than 5 minutes (most samples)

Operating Environment

5 to 50°C (39.2 to 122°F)

20 to 80% Relative Humidity

(non-condensing)

Temperature Control

15 to 50°C ( $\pm 0.2^\circ\text{C}$ )

### Universal Power

110 V to 220 V AC, 50/60 Hz

Less than 0.4 amps

### Data Interface

RS232A compatible, 8-data bit

ASCII code, 9600 baud, no parity,

1 stop bit, cable included

### Warranty

Three years, factory parts & labor

### Test Result Memory

8,000 readings (each reading

includes water activity, temperature, time, date, operator, and sensor used)

### Program Identification

Alphanumeric; Programmable to display product name, lot, or product ID number

## AQUALAB 4TEV

### Samples Containing Volatiles

All the features of the Series 4TE plus a volatiles sensor for measuring samples containing propylene glycol, ethanol and other volatiles.

### Easy Switching

The AquaLab 4TEV comes with both a volatiles capacitance sensor and the standard Series 4 dewpoint sensor. You can switch between sensors using the 4TEV instrument menu.

### Volatiles sensor accuracy:

$\pm 0.015$  aw

### Non-volatiles sensor accuracy:

$\pm 0.003$  aw

# Dew Point Moisture



## AQUALAB 4TE DUO SPECIFICATIONS

### Sensor Types

- Chilled-mirror dewpoint.
- Infrared temperature.

### Accuracy

±0.003 aw

### Range

0.10 to 0.95 aw

### Moisture Content Precision

0.02%

### Agreement to Moisture Content

#### Reference Method

±0.1% to ±0.5%

### Resolution

±0.01% mc

±0.0001 aw

### Measurement Speed

Less than 5 minutes (most samples)

### Results Displayed

Percent moisture and water activity

### Temperature Control

15 to 50°C (±0.2°C)

### Temperature Stability

User-selectable range, internal thermoelectric controlled

### Test Result Memory

8,000 readings (each reading includes water activity, moisture content, temperature, time, date, operator, and sensor used)

### Program Identification

Alphanumeric; Programmable to display product name, lot, or product ID number

### Operating Environment

4 to 50°C (39.2 to 122°F)

0 to 90% Relative Humidity (noncondensing)

### Universal Power

110 V to 220 V AC, 50/60 Hz

Less than 0.4 amps

The AquaLab 4TE DUO uses the “dewpoint method” to measure moisture content and water activity with the same instrument. The result: complete moisture analysis in about 5 minutes with some big advantages over traditional moisture meters.

### How It Works

The dewpoint method doesn't use chemicals or high temperatures. Using it is as easy as sealing a lid over a sample and waiting for vapor equilibrium. Inside the instrument, an infrared beam focused on a tiny mirror determines the precise dewpoint temperature of the sample. That dewpoint temperature is then translated into moisture content and water activity readings. Because the instrument is lightweight, portable, and easy to use, it puts precision moisture content readings in the hands of virtually anyone on the production line or in the supply chain.

### Testable Accuracy

Standardization issues have often made moisture content more opinion than fact. As one manufacturer said, “My suppliers quote me what the moisture content was when the ingredient shipped. That number's meaningless. They can say whatever they want because we don't have reliable standards to measure against.”

The dewpoint method lets you validate moisture content readings with independently verifiable salt standards. DUO stores time, date, and user information with every calibration and measurement, and includes administrator passwords and access restrictions so you can ensure the integrity of your data.

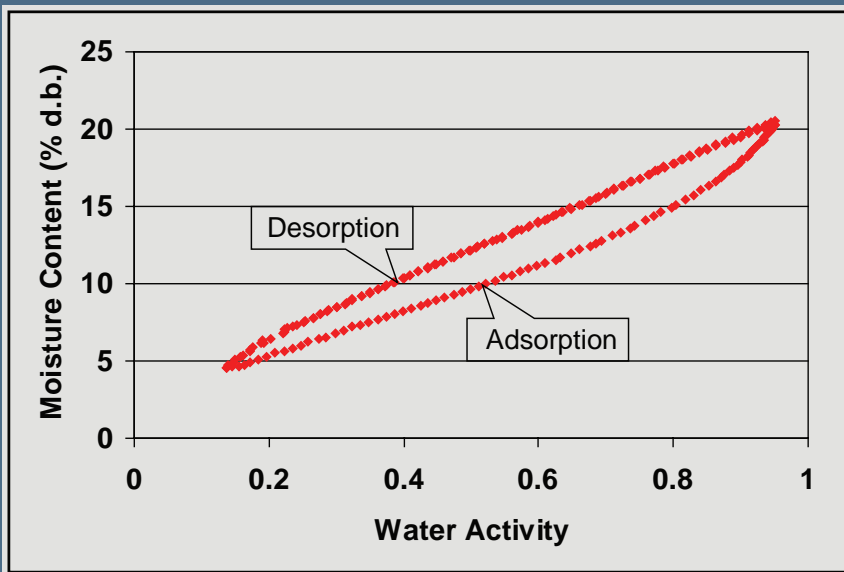
Scan the QR code with your smart phone to read more about the AquaLab 4TE DUO on our website



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# Moisture Sorption



AQUALAB VSA, an affordable isotherm generator, uses the chilled-mirror technology. The Dynamic Dewpoint Isotherm (DDI) method gives you full sorption isotherm curve development—hundreds more data points in days *instead of weeks*. An easy to use software program simplifies data collection and analysis, including BET and GAB determination.

## High Resol

**T**he way a product behaves as humidity changes can reveal important insights. This type of measurement is called an isotherm (changing humidity as temperature stays the same). Isotherms hold the key to understanding hidden details of food and pharmaceutical products.

# DVS + DDI methods in one single instrument - easy, fast, accurate!



## Set Specifications

Determine the most stable water activity for your food product and predict reactions and textural changes that end shelf life

## Guide Formulation

Map out how an ingredient or recipe will respond as you change formulation

## See Details

Typical isotherms have fewer than a dozen points. AquaLab Vapor Sorption Analyzer generates over 100 for each isotherm curve

## Measure Shelf Stability

Predict how abuse conditions like high humidity will affect shelf life



Scan the QR code with your smart phone to read more about the AquaLab VSA on our website.

## AQUALAB VSA (VAPOR SORPTION ANALYZER) SPECIFICATIONS

### Water Activity

Accuracy  $\pm 0.005aw$

Repeatability  $\pm 0.003 aw$

Range 0.030 to 0.950 aw

### Isotherm Methods

Dynamic Dewpoint Isotherm (DDI) & Static (DVS)

### External Gas

Not needed—If external gas, no more than 7PSI

Computer Interface USB

Mass Resolution  $\pm 0.1 mg$

Water Reservoir 20ml

Sample Cup Volume 10cc

Sample Weight 500 to 5,000mg

### Power

10 V to 220 V AC, 50/60 Hz

Weight 28 lbs

Temperature 20 to 60 °C

Temp Stability  $\pm 0.1 ^\circ C$

### Dimensions

W 10" x L 15" x H 12"

25.4cm x 38.1cm x 30.5cm

## Production Isotherm in Two Days

### Formulate Intelligently

A pharmaceutical manufacturer wants to formulate a production version of a drug that has just finished clinical trials. Isotherms show them which excipients can be combined with the API to create a stable product. Vapor sorption also shows them how the pill will perform under abuse conditions.

### What's New

If isotherms are so useful, why doesn't everyone make them? Making isotherms by hand takes too much time and effort. Historically, instruments that do this were much too expensive for most R&D departments. Also, both approaches were overly complex. The AquaLab Vapor Sorption Analyzer

changes this—it's simple to use, affordable, and performs both static and dynamic vapor sorption analysis with ease.

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# Capacitance Water Activity



- AquaLab LITE water activity is affordable, easy to use, low maintenance and single operation device.

**A**quaLab LITE assures the quality and safety of your food products by monitoring water activity. Better than the Pawkit but still portable and rugged. Featuring a capacitance sensor and intuitive operation, the LITE is a great choice for small food producers. The LITE has an easy 3 button interface, just close the lid, press start and get your aw measurement in 5 minutes. Built for high throughput yet low maintenance.

## AQUALAB LITE SPECIFICATIONS

Operation environment  
4 to 50°C (39 to 122°F),  
0 to 90% Relative Humidity (non-condensing)

Sensors  
Dielectric humidity sensor and infrared  
sample surface temperature

Range 0 to 1.000 aw  
Accuracy  $\pm 0.015$  aw  
Resolution 0.001 aw

## Accessories



### VERIFICATION STANDARDS

Premixed, certified salt solutions for daily AquaLab performance verifications. Select standards which cover the range of water activities you typically measure. Unopened vials have a one year shelf life.

The following standards are available:

- Distilled water (1.000  $\pm$  0.003 aw at 25° C)
- 0.5 M KCl (0.984  $\pm$  0.003 aw at 25° C)
- 6.0 M NaCl (0.760  $\pm$  0.003 aw at 25° C)
- 8.57 M LiCl (0.500  $\pm$  0.003 aw at 25° C)
- 13.41 M LiCl (0.250  $\pm$  0.003 aw at 25° C)



### SAMPLE CUPS

15 ml disposable sample cups with airtight lids. Used in the AquaLab Series 4 (4TE, 4TEV, 4 DUO), Pawkit, AquaLab Lite, and VSA.



**P**awkit is the only water activity instrument to combine portability, reliability and affordability. Ideal for rough environments where quick, inline water activity measurements are needed. Staple for safety inspectors, meat processors, and consultants.

#### Pawkit SPECIFICATIONS

##### Operation environment

5 to 50°C (41 to 122°F)

0 to 90% relative humidity (non-condensing)

##### Sensor

Dielectric humidity sensor

Measurement speed 5 minutes

Range 0 to 1.0aw

Accuracy  $\pm 0.02aw$

Resolution  $\pm 0.01aw$

Battery life 3 years typical



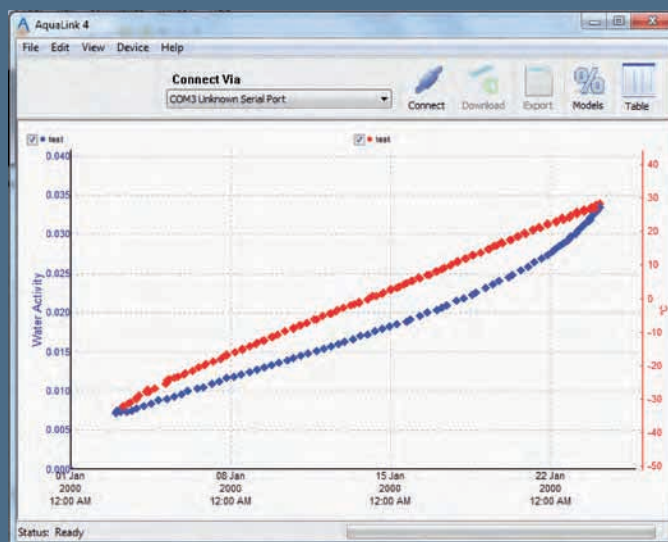
Scan the QR code with your smart phone to read more about the Pawkit on our website.

**A**quaLink Software helps users organize, visualize, and track measurement data. AquaLink Software downloads measurements made by AquaLab Dew Point Water Activity Meters and creates reports containing user selected pertinent information.

Users may save personalized report templates, allowing easy repeatable report generation. AquaLink Software manages isotherm models on AquaLab Dew Point 4 DUO instruments.

#### AQUALINK SOFTWARE BENEFITS

- Advanced data filtering capabilities
- Manages multiple AquaLab 4 instruments
- Savable reporting capabilities
- AquaLab DUO model management



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# Water Activity and Growth of Microorganisms in Food\*

\* Adapted from L.R. Beuchat, Cereal Foods World, 26:345 (1981)

	Range of $a_w$	Microorganisms Generally Inhibited by Lowest $a_w$ in This Range	Foods Generally within This Range
	1.00–0.95	Pseudomonas, Escherichia, Proteus, Shigella, Klebsiella, Bacillus, Clostridium perfringens, some yeasts	Highly perishable (fresh) foods and canned fruits, vegetables, meat, fish, milk, and beverages
	0.95–0.91	Salmonella, Vibrio parahaemolyticus, C. botulinum, Serratia, Lactobacillus, Pediococcus, some molds, yeasts (Rhodotorula, Pichia)	Some cheeses (Cheddar, Swiss, Muenster, Provolone), cured meat (ham), bread, tortillas
	0.91–0.87	Many yeasts (Candida, Torulopsis, Hansenula), Micrococcus	Fermented sausage (salami), sponge cakes, dry cheeses, margarine
	0.87–0.80	Most molds (mycotoxigenic penicillia), Staphylococcus aureus, most Saccharomyces (bailii) spp., Debaryomyces	Most fruit juice concentrates, sweetened condensed milk, syrups, jams, jellies, soft pet food
	0.80–0.75	Most halophilic bacteria, mycotoxigenic aspergilli	Marmalade, marzipan, glacé fruits, beef jerky
	0.75–0.65	Xerophilic molds (Aspergillus chevalieri, A. candidus, Wallemia sebi), Saccharomyces bisporus	Molasses, raw cane sugar, some dried fruits, nuts, snack bars, snack cakes
	0.65–0.60	Osmophilic yeasts (Saccharomyces rouxii), few molds (Aspergillus echinulatus, Monascus bisporus)	Dried fruits containing 15-20% moisture; some toffees and caramels; honey, candies
	0.60–0.50	No microbial proliferation	Dry pasta, spices, rice, confections, wheat
	0.50–0.40	No microbial proliferation	Whole egg powder, chewing gum, flour, beans
	0.40–0.30	No microbial proliferation	Cookies, crackers, bread crusts, breakfast cereals, dry pet food, peanut butter
	0.30–0.20	No microbial proliferation	Whole milk powder, dried vegetables, freeze dried, corn starch, potato chips, corn chips

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