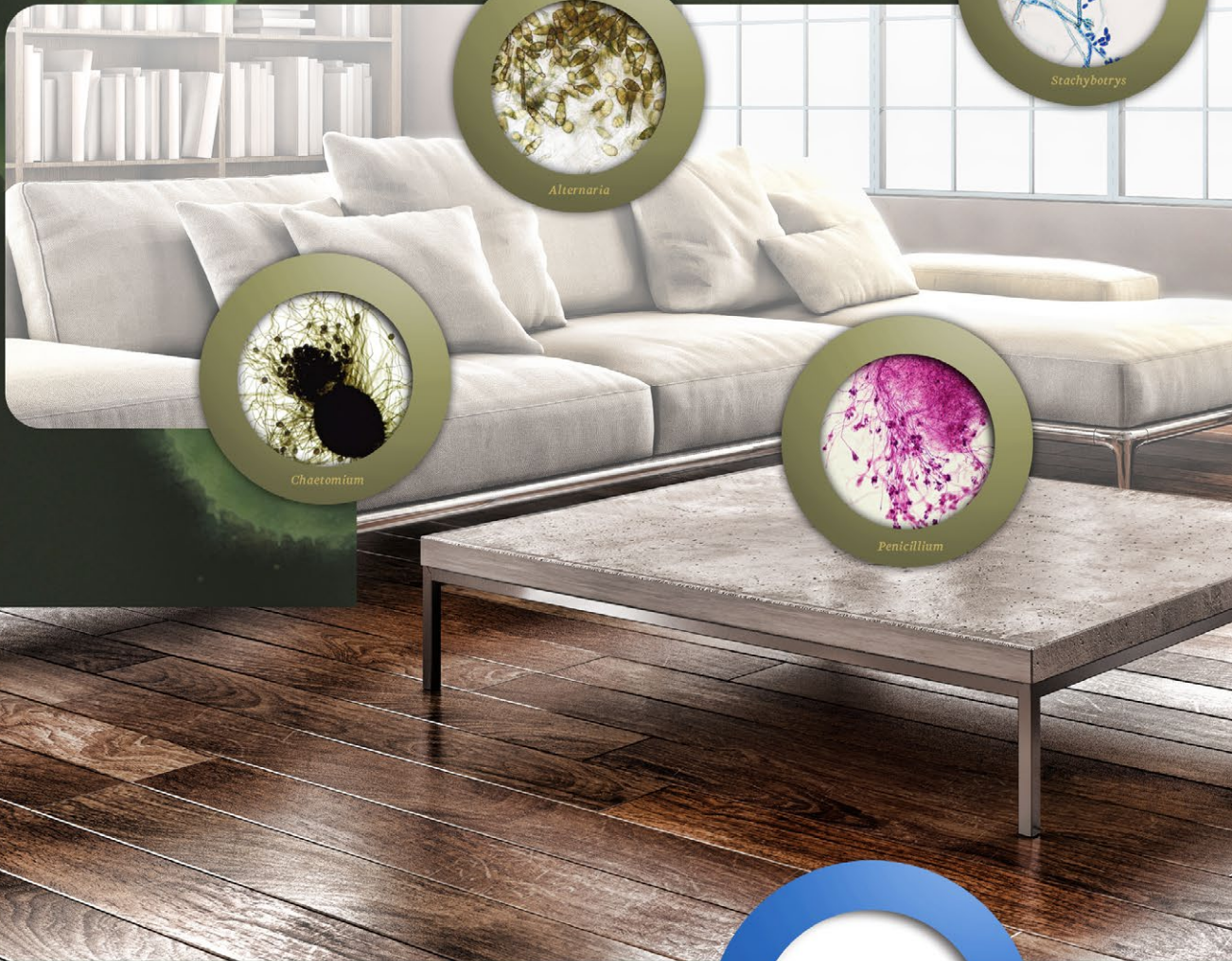
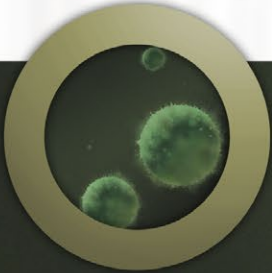


Control Mold Through Water Activity

Prevent Mold Growth on Building Materials



Chaetomium



Alternaria



Stachybotrys

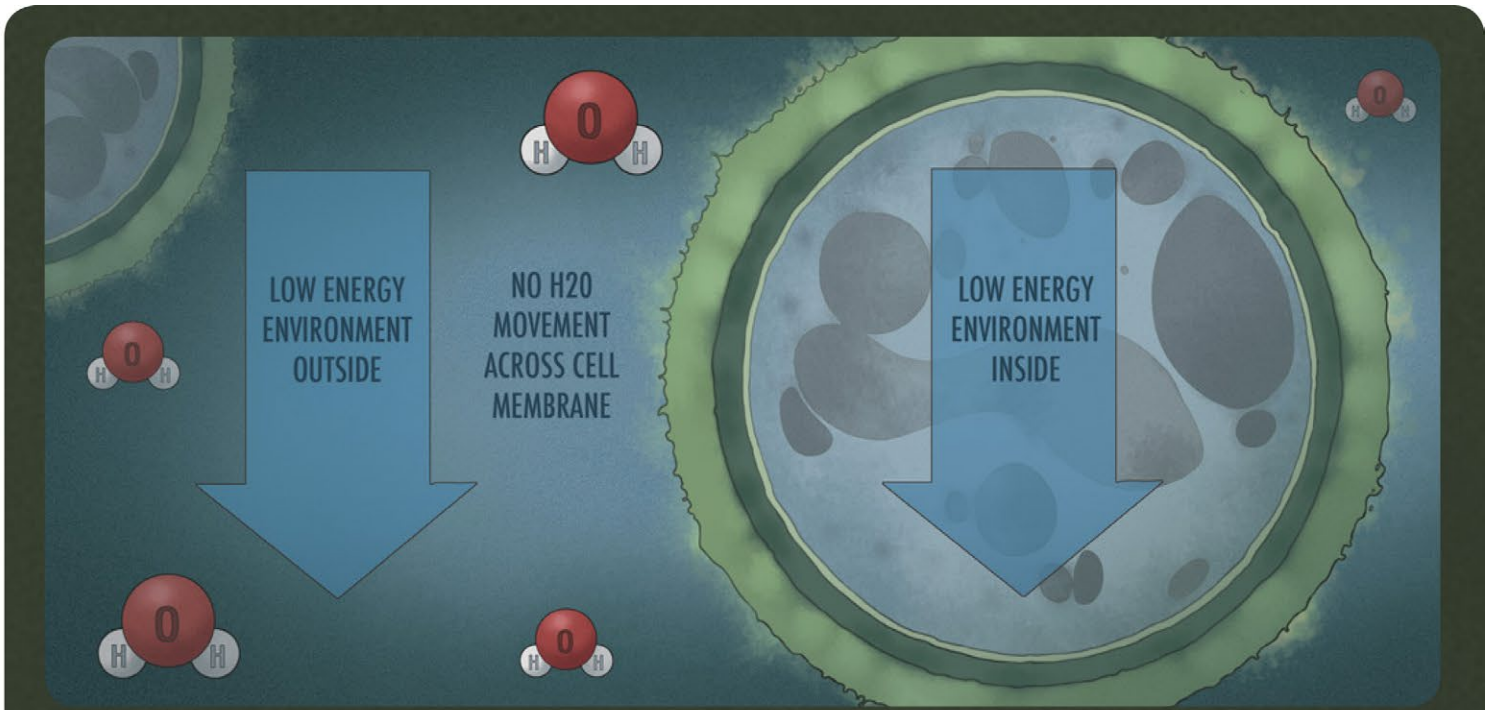


Penicillium

Mold Prevention

- Detect Dangerous Moisture Levels in Building Materials
- Monitor Buildings for Leaks and Moisture Intrusion
- Track the Progress of Restorative Drying





Fungi require three things in order to grow:

- 1 A source of nutrients
- 2 A suitable environment temperature
- 3 Water



Low Moisture Limits Mold Growth

Inside of our Buildings

Modern buildings provide plenty of nutrients and more than adequate temperatures for most fungi. In fact, we often pre-digest nutrients by chopping and blending natural fibers in materials like plywood, particle board, and sheet rock.

That means low moisture is the principal “factor staving off mold growth in 99% of our buildings.” (*Dobranic, 2013*)

Understanding Moisture

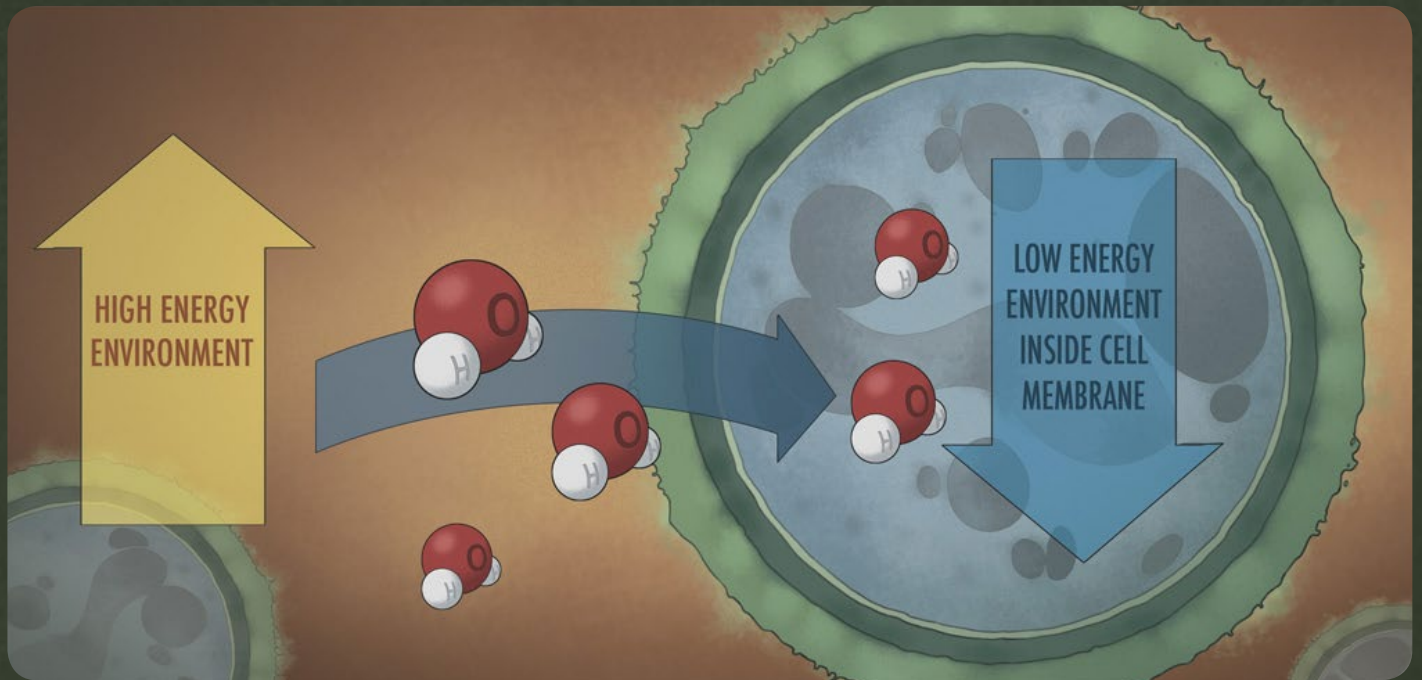
From the Perspective of Fungi

Mycologists use “water activity” to measure whether or not a material is susceptible to mold growth (*FSEC, 2007; Menetrez et al., 2004; Pasanen et al., 2000*).

Water activity measures the “active” component of water—the amount of water available to fungi for growth. Though moisture is often measured on a percentage content basis, that’s not the way fungi see it. To mold spores, only the available moisture matters.

In other words, water content measurements are helpful but crude. Water activity, on the other hand, can reliably predict whether or not molds will proliferate on a specific material.





Water Activity

A Measurement with Scientific Credentials

Scientists have studied water activity limits for decades, and known fungi have well-established growth limits. By testing and knowing the water activity of a material, you will know whether or not mold can grow on it.

“Water activity measures the active component of water in a substrate; in simple terms, it is the water available to fungi for growth.”

Jason Dobranic

VP of Microbiology and Mycology, EMSL Labs

Water activity is the moisture test used by mycologists
Learn more about Water Activity www.aqualab.com

Why Water Activity Predicts Mold Growth

Like all organisms, molds rely on water for growth. They take up water by moving it across the cell membrane. This water movement mechanism depends on a water activity gradient—on water moving from a high water activity environment outside the cell to a lower water activity environment within the cell.

When water activity outside the cell becomes low enough, it causes osmotic stress: the cell cannot take up water and becomes dormant. The mold is not eliminated, it just becomes unable to grow. Different organisms cope with osmotic stress in different ways. These adaptations are reflected in the different water activity growth limits for different fungi shown in the chart in the back of this guide.

Preventing Mold Damage

Before Remediation is Necessary

Water activity gives you a distinct advantage in dealing with mold: you don't have to guess what is "too wet" and what is "dry enough." You can test using a scientifically valid measure.

If building materials have become damp, you can test to see if they are too wet. If you are drying materials, you can test to know when to stop drying. Water activity gives you the power to make the best possible decisions about moisture.



Wet Enough *to Mold?* Dry Enough *to Be Safe?*

Reliably predict whether or not mold can grow on any building material.



1 Attach

Attach the sensor temporarily or permanently to walls, roofs, flooring, or any construction material.



2

Measure

The sensor creates a sealed chamber where the "water activity" of the material can be continuously monitored.



Remote monitoring from any wireless device

3

Know

Sensors are connected to a data logger, which can be monitored remotely via wireless signal, internet or smartphone.



That's it.

AquaLab Mold Prevention System



- **Detect When Materials Are Dry Enough**
- **Monitor Drying Process Accurately**
- **Get Alerts When Moisture Levels Become Hazardous**
- **Confidently Know When Moisture Levels are Safe**
- **Detect the Infiltration of Water**
- **View Updates on Your Smartphone**

Water activity is a direct measure of the moisture available to microbes. Using well-established fungal growth limits, you can reliably predict when materials are wet enough to mold.

Request Demo

Interested in a Demo Unit?

Contact AquaLab Mold Prevention at 1-800-755-2751 or moldprevention@aqualab.com.

References:

Menetrez, M. Y., Foarde, K. K., Webber, T. D., Betancourt, D., and Dean, T.. 2004. Growth Response of *Stachybotrys chartarum* to Moisture Variation on Common Building Materials. *Indoor and Built Environment*, No. 13, pp. 183-187.

Pasanen, A. L., Kasanen, J. P., Rautiala, S., Ikaheimo, M., Rantamaki, J., Kaarianen, H., and Kalliokoski, P. 2000. Fungal growth and survival in building materials under fluctuating moisture and temperature conditions. *International Biodeterioration & Biodegradation*, No. 46, pp. 117-127.

University of Central Florida. 2007. Mold Growth. www.fsec.ucf.edu/en/consumer/buildings/basics/moldgrowth.htm

Molds, Allergies and Water Activity Growth Limits in Buildings

	Mold Species and Class	Range a_w Water Activity	Suitable Substrates Indoor Environment	Allergenic Potential	Potential Opportunist or Pathogen
Hydrophilic	Stachybotrys	0.94 ↑			Produces a variety of mycotoxins. Exposure to toxins can occur through inhalation, ingestion, or skin exposure.
	Chaetomium	0.90 ↑	Water damaged building materials: lumber, insulation, sheetrock, wall paper, textiles	Hay Fever, Asthma	Onychomycosis
	Trichoderma	0.900 ↑			Various diseases in immunocompromised individuals
	Aureobasidium	0.85 ↑	Damp areas including kitchens, bathrooms, grout, painted interior surfaces	Skin irritant causing dermatitis, hay fever, asthma	Keratomycosis, Phaeohyphomycosis, Pulmonary mycosis with sepsis
Mesophilic	Cladosporium	0.84-0.88	Fiberglass duct liner, paint, textiles, any water damaged building materials	Hay Fever, Asthma	Edema, Keratitis, Onychomycosis, Pulmonary Infections, Sinusitis
	Alternaria	0.85-0.88	Indoors near condensation (window frames, Showers), house dust, building supplies, textiles	Hay Fever, Asthma, hypersensitivity pneumonitis	Phaeohyphomycosis chronic hypertrophic sinusitis
Xerophilic	Penicillium	0.78-0.86	Wallpaper, some textiles, house dust	Hay Fever, Asthma	Penicilliosis
	Aspergillus	0.75-0.82	Grows on a wide range of substrates indoors	Allergic bronchopulmonary aspergillosis, Aspergillus sinusitis, Invasive aspergillosis in immunocompromised patients	Aspergilloma and chronic pulmonary aspergillosis in people with lung disease

Other AquaLab Products



AquaLink 4

- Manages multiple AquaLab 4 instruments
- Improved data filtering capabilities
- Easily generate Microsoft Excel files or copy and paste measurements directly
- Now includes graphing system to analyze data
- Simplified isotherm model management
- User configurable annotations and notes



Series 4

Water Activity Meter.



4TE

Water Activity Meter. Temperature Control (Between 15-50°C).



4TEV

Water Activity Meter. Temperature Control (Between 15-50°C). Volatiles Sensor.



DUO

Moisture Analyzer. Water Activity. Moisture Content.



VSA

Vapor Sorption Analyzer. Dynamic & Static Moisture Sorption Isotherm generation.



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.

Available Standards:

- Distilled water (1.000 ± 0.003 a_w at 25° C)
- 0.5 M KCl (0.984 ± 0.003 a_w at 25° C)
- 2.33 NaCl (0.920 ± 0.003 a_w at 25° C)
- 6.0 M NaCl (0.760 ± 0.003 a_w at 25° C)
- 8.57 M LiCl (0.500 ± 0.003 a_w at 25° C)
- 13.41 M LiCl (0.250 ± 0.003 a_w at 25° C)



Sample Cups

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

Available in boxes of 500 & 2,500



Cleaning Kit

Contains all cleaning materials needed to clean a benchtop water activity meter, a portable water activity meter, or a vapor sorption analyzer for one year for most customers.

1 Year Supply

Need supplies? Go to store.aqualab.com

Technical Support: Monday- Friday 7am -5pm (P)
email: support@aqualab.com

We can solve the mold problem. It will take some effort to change the way we think about building design, construction, and maintenance but we can solve the mold problem. We invite you to gain an understanding of water activity and how our instrumentation can help you do your job better by providing a solution with good science. Please contact me with any questions.



John Zeugschmidt

moldprevention@aqualab.com
509-332-5581

To demo our mold prevention system and help us further the science of moisture in buildings please contact me:



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