Control Mold Through Water Activity

Prevent Mold Growth on Building Materials

Mold Prevention

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

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.

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.

A Measurement with Scientific Credentials

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“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
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.

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

That’s it.
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.

References:


### Molds, Allergies and Water Activity Growth Limits in Buildings

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

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**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 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)

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**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

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**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

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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: