

BREATHABILITY AND MOISTURE – A KEY TO BUILDING PERFORMANCE

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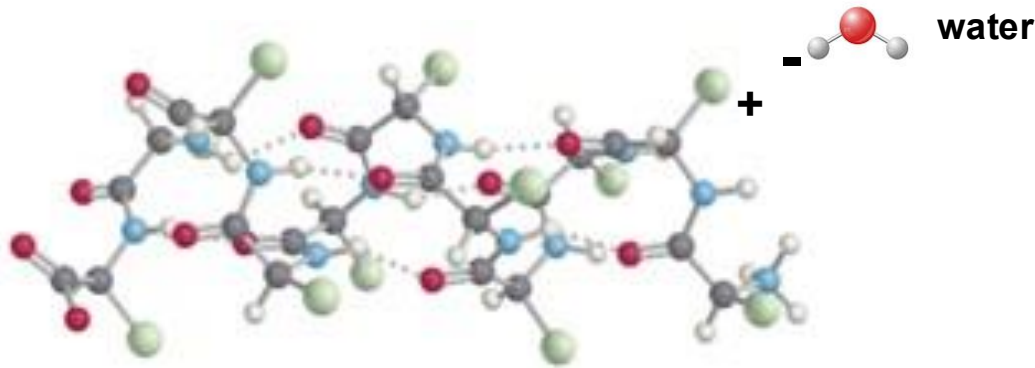
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What is a breathable material?

- ▶ Adjusts its moisture content to be in balance with surrounding humidity.
- ▶ Adjusts surrounding humidity to be in balance with its moisture content.
- ▶ Is able to bind water molecules in a harmless way.
- ▶ Is vapour open.

What insulation materials are breathable?

- ▶ Any fibre containing, keratin, cellulose, hemi-cellulose or lignin.
- ▶ Small regions of these molecules have a slight electrical charge and attract water molecules like magnets.
- ▶ Wool, hair, wood, hemp, coir, flax, jute, cotton, cork.



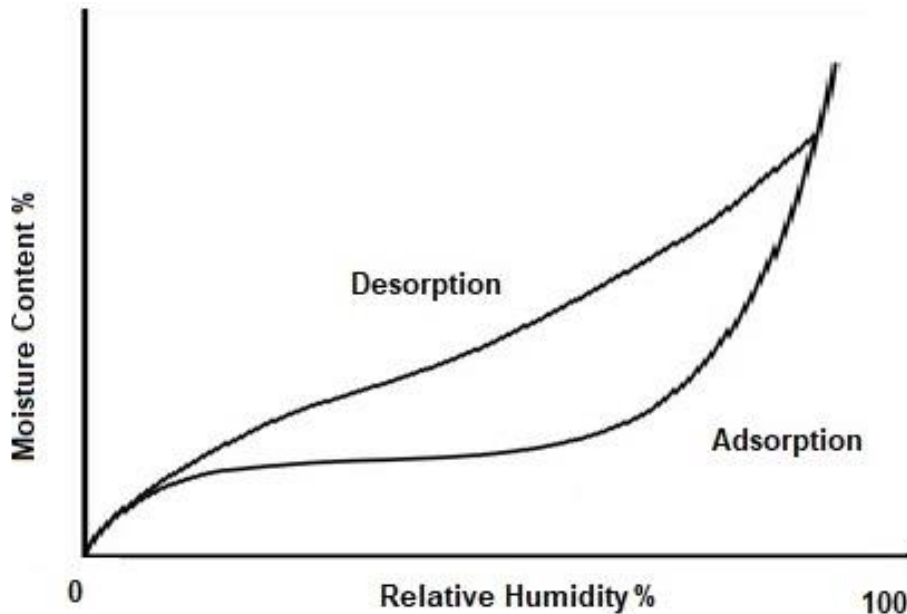
Keratin

Adsorption & Desorption

- ▶ The process of binding and releasing water molecules.
- ▶ **Adsorption** – water vapour is pulled from the air and bound to the natural fibre through static electricity
- ▶ **Desorption** – the electrostatic bond is broken and water molecules are released to the air as water vapour.

What Drives Sorption & Desorption?

- ▶ NF's are constantly capturing and releasing water vapour from the air.
- ▶ NF's want to capture as much water as they release to reach equilibrium moisture content (**emc**).
- ▶ At a given temp and relative humidity the NF wants to achieve a specific moisture content.



What Drives Sorption & Desorption?

Sorption is mainly driven by relative humidity

NFI adsorbs moisture



Higher relative humidity

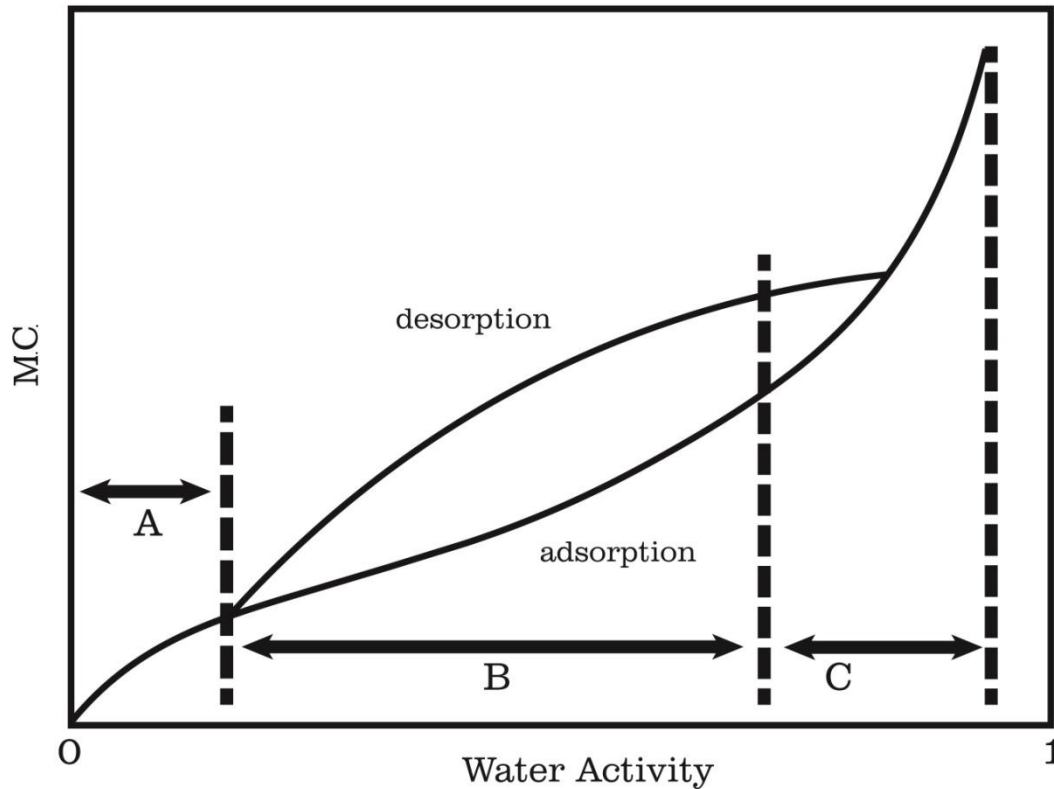
NFI desorbs moisture



Lower relative humidity

Relative humidity is mainly driven by temperature

Sorption & Humidity Buffering



A – strongly bound

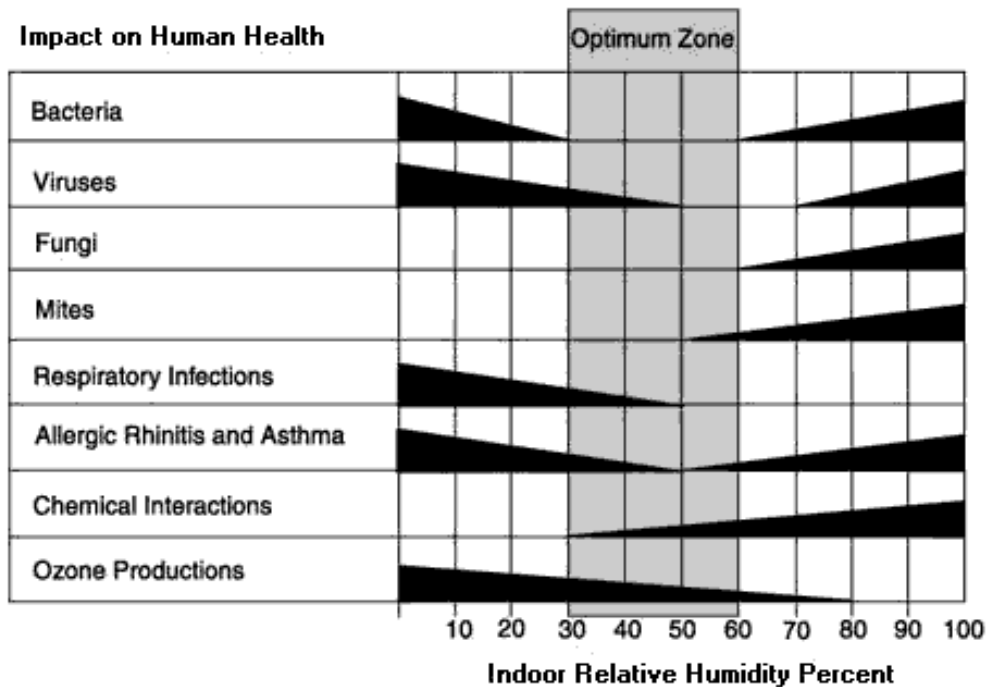
B – less strongly bound

C – free water

Zone B is the humidity buffering zone

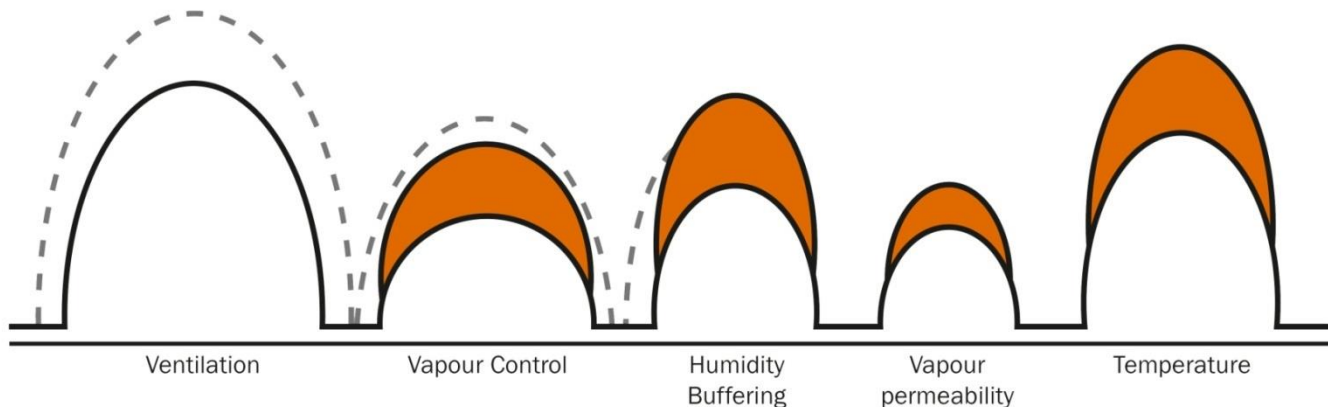
Why is Breathability Important?

- ▶ Moisture can cause health problems and damage the building fabric
- ▶ Breathable materials help keep humidity within the optimum zone for human health.
- ▶ Breathable materials bind moisture in a harmless way.



Why are Breathable Materials Important?

- ▶ Approximately 95% of moisture is removed from buildings through ventilation.
- ▶ What about the other 5%? That's the equivalent of two bathtubs of water not ventilated each year.
- ▶ We need to make use of all available technologies including breathable natural fibre insulation.





France (Channel
Manche) England

SB&WRC

European Regional Development Fund



THANK YOU

ANY QUESTIONS?