

## Equilibrium partitioning of organic compounds

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## Question 6

Modern outdoor textiles are waterproof. At the same time, these materials are supposed to let water vapor pass from the inside to the outside. This increases the comfort: not only do you not get wet from the rain but also does water vapor from transpiration diffuse from the inside to the outside. But can this really work? During a rain event, the relative humidity in the air is close to 100%. Assume that the membrane of your waterproof jacket does indeed have tiny pores through which water vapor molecules can pass to the outside as claimed by the manufacturer? But would there really be a net transport to the outside if there is 100% humidity on both sides of the membrane?

**Answer:** It is not the relative humidity but the absolute vapor concentration that determines whether water molecules move across the membrane. At the temperature of the rain, 100% rh corresponds to a much smaller water vapor concentration (in [mol/L]) than 100% rh at body temperature. So, there is a concentration gradient in water vapor between the inside and the outside of the jacket. In other words: water vapor transport from the inside out will work best the lower the outside temperature is. In the tropics at 37°C outside temperature and 100% RH it will not work any more.



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