

Quantitative equilibrium calculations

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Question 3

In the context of REST ([see Chapter 2 for explanation](#)) it has been thought for several years that sampling the air above a soil (and not the dust) is the way to go. Why isn't this a good option?

Answer:

There are two main reasons:

- i) The concentration of signature compounds in the air above a soil will always be smaller than the equilibrium gas phase concentration due to the dilution generated by turbulent air. If instead a soil sample is presented to the animal in a close building, dilution of the gas phase above the sample through turbulences can be minimized.
- ii) Ideally (i.e. assuming equilibrium conditions), a soil sample taken from above a mine and presented later on to the dogs will create the same gas phase concentration as the original soil did in the field. Collecting a gas phase sample on a filter and subsequently presenting this filter to the dogs will however not reproduce the original gas phase concentration because the filter has a substantial affinity for the explosives (other wise it would not have worked as efficient filter in sampling) and will therefore release only a small fraction of originally sampled molecules to the gas phase. Thus, the gas phase concentration presented to the animals will be much smaller than the original gas phase concentration in the field (and in addition the odour pattern will be different).

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