

Documentation of decomposition and source detection of pesticides in groundwater

In Denmark, we have a unique water supply and politicians have determined that the groundwater must be clean. This means that you must be able to pump it and use it directly by use of simple water treatment only (aeration and filtration). However, this practice is in danger, as the water supplies in Denmark are facing a great challenge. It is especially the degradation products of previously used pesticides that are causing trouble. One of the problematic pesticides is the degradation product desphenyl chloridazon. In approx. 10% of water supply wells the presence of desphenyl chloridazon above the criterium for groundwater quality has been observed. Desphenyl chloridazon is a decomposition product of the previously used chloridazon pesticide.

It is the regions who are responsible for investigation and remediation of sites that are contaminated with pesticides so that the Danish groundwater will continue to be clean for future generations. The regions have several cases related to soil and groundwater that include pesticides and which can be difficult to complete, and that is because the risk assessment that have been carried out often ends with statements such as "it cannot be rejected that there may be a risk in relation to the groundwater or water supply going forward." That is why an extra tool is required for completing an efficient and solid risk assessment. This may lead to a more qualified prioritisation of remediation of the polluted sites, if any, and supplemental investigations. An assessment of the potential for natural degradation is an important parameter in this connection. Natural degradation takes place when pesticides are "eaten" by a natural bacteria in the aquifer storage.

Stabile isotopes are the naturally present isotopes of carbon, for example. Isotopes are almost identical molecules with a different number of neutrons, which means that a molecule may be lighter or heavier. Bacteria would rather "eat" the lightest molecules, which is why they eat these first. In this way, by analysing different isotopes it is possible to assess whether there is a potential for natural degradation. This is the knowledge that the method is based on.

In the past 20 years, stabile isotopes have been used to document the degradation of more well-known pollution components, for example chlorinated solvents which have previously been used in dry cleaners and for removal of metal parts before painting. A development of this method is required so that it can also be used for "new" problematic pesticides. Thus, the purpose of the project is to develop a commercial and accessible method of analysis for stabile isotopes on desphenyl chloridazon. In addition, it must be examined if the method can be used as an important tool for tracing sources and documentation of degradation in relation to two cases in the Region of Southern Denmark and Region Zealand.