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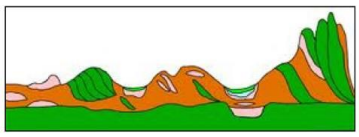
Water is Life
The Local Approach

Cliff of Møn and chalky water

This picture shows the cliff situated in the eastern part of the community of Vordingborg.
It illustrates the thick layer of chalk and shows how it colours the sea.
The chalk is made through millions of years
It is made from algae with shells made of $CaCO_3$



Green colour = chalk.
Brown colour = clay
Light pink spots = pockets of sand

Groundwater

Danish drinking water is different from many other countries. In Denmark we are able to use groundwater, whereas many other countries are extracting their drinking water from surface water.

Clean Drinking Water?

Drinking Water in Vordingborg

The illustration above shows water extractions in the community of Vordingborg. The community area is 621 km².

Vordingborg has high standards when it comes to the quality of drinking water. One of the primary issues for Vordingborg is, that areas with groundwater useful as drinking water must not be used for activities that causes pollution. By avoiding this, we protect and secure our clean drinking water.

The table below shows the permitted limits of chemicals in drinking water. These values are given by the EU.

Parameter	Parameter permit limit	Unity
Copper	2,0	mg/l
Fluoride	1,5	mg/l
Quicksilver	1,0	µg/l
Nickel	20	µg/l
Nitrate	50	mg/l
Nitrite	0,50	mg/l
Pesticide	0,10	µg/l
Aluminium	200	µg/l
Chloride	0,50	mg/l
Oxygen consumption	5,0	mg/l O_2
Sulphate	250	mg/l
Sodium	200	mg/l
Coliform bacteria	0	Number/100 ml
pH	≥ 6,5 & ≤ 9,5	pH - unity

Experiment

This experiment investigates the effect of UV irradiation of surface water. This is interesting because some waterworks UV-irradiate the drinking water. If lake water should be used as drinking water, it would be helpful to find the effect of UV irradiation – and how many of the bacteria this preperation/treatment will actually kill. Knowing this is perhaps a part of the explanation for the use of groundwater, because we want the cheapest treatment of the water. Using surface water or groundwater might make the difference in government budgets.

Hypothesis

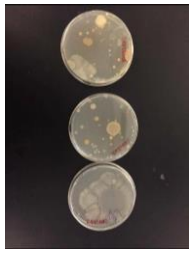
We expect that UV irradiation of water will reduce the bacterial content, and the water will be more optimal for drinking water.

Materials

- Water sample from the Hulemosesø (0,5 litre)
- 6 sterile Petri dishes with LB agar (nutrient for the bacteria)
- 2 control samples (sterile Petri dishes with LB agar without water sample)
- Incubator (about 30 degrees) UV-pen
- Drigalski spatula

Procedure

- Store the water sample in a sterile container Set up two control plates with agar, without water samples
- Put 600 µ from the water sample on three of the plates (200 µ on each)
- Sterilize a drigalski spatula
- Use the drigalski spatula to distribute the water sample on the agar
- UV-irradiate 500 mL of the water sample
- Put the UV-irradiated water on 3 of the plates (200 µ on each)
- Sterilize a drigalski spatula
- Use the drigalski spatula to distribute the water sample on the agar
- Place the 6 plates with water samples (+ the two control plates) in a incubator



First picture from the left shows bacteria from regular Danish lake water. The picture in the middle shows water that is being UV-irredated. Last picture shows bacteria from UV-irradiated lake water.

On the picture above, we see the lake close to Vordingborg, where our water samples come from.

Conclusion

When you irradiate water, some of the bacteria will die, but others are able to have better conditions to live and reproduce themselves. UV irradiation works by cutting the DNA into smaller pieces. This is the reason why some of the bacteria in our experiment died.

How is this experiment useful knowledge?

We discovered that the UV-irradiation removed some bacteria, but not all. This shows that the surface (lake) water is not qualified as drinking water, if it has been treated only with UV irradiation.