

CLIL

an example from Chemistry

CLIL – Soil Analysis

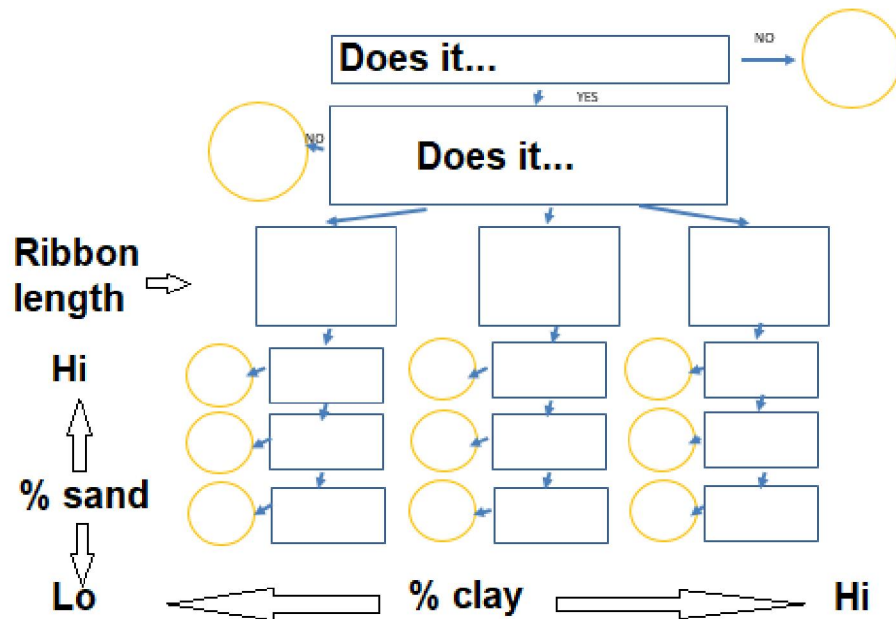
- 3 lab afternoons (four 50 min lessons per afternoon)
- Soil sampling
- Texturing
- pH testing
- Water holding capacity
- Settling test
- Salinity
- Ammonium, nitrate, lime concentration
- Soluble iron
- Ammonification
- Interpreting data in terms of soil quality

Soil Texturing

- **Students watch the following videos. The students should try to fill in the flow chart provided with the information given in the video.**
- **Video: Youtube: How to test your soil – texture 3:39min**
- **Video: Youtube: Soil texture by feel 4:04 min**
- <https://www.youtube.com/watch?v=fufeaLBLGIk>
- <https://www.youtube.com/watch?v=GWZwbVJCNEc>

Soil Texturing

Try to create a flow chart in order to determine the soil type of your sample by gathering information from the video:



Language Box:

sand – Sand

silt – Schluff

clay – Ton

loam - Lehm

palm - Handfläche

gritty – grobkörnig

smooth – glatt, geschmeidig

ribbon – Band

squeeze - drücken

knead - kneten

silky - seidig

moldable – formbar

Use your flow chart to explain to your lab partner how soil texturing works (like the expert in the video, using the following phrases from the language box provided):

Language Box:

Mix the soil

Rub the soil

Work the soil

If it feels / If you can hear / If it makes a ball ...

When it...

Then ...

Soil Texturing – Expert Talk



Soil Texturing

Use your flow chart to determine the soil type of your sample. Explain to your lab partner what you are doing (like the expert in the video, using the following phrases from the language box provided):

Date:

Used sample:

Lab partner:

Result:

Language Box:

Mix the soil

Rub the soil

Work the soil

If it feels / If you can hear / If it makes a ball ...

When it...

Then ...

Soil Texturing – Practical Work



Soil Texturing – Practical Work



pH Testing

The lab group is split up into 3 equally sized groups. Members of group one get text 1 to read, members of group 2 get text 2 to read, members of group 3 get text 3 to read. They are asked to summarize the text using a mind map. Afterwards, they work together in their groups and explain to each other, what the text was about, and they complete their mind maps/notes. Then they get together in groups of 3 (one person from group 1, one from group 2, one from group 3). They explain to each other what their text was about. After that they change groups and repeat the task.

pH Testing – Group Reading Activity



pH Testing

Material required: pH-meter, scale, beakers, sieve, magnetic stirrer, stir bar

Chemicals: 0.01 mol/L CaCl_2 -solution

Method potential pH:

1. Put 20 ml of your sieved (2 mm) soil sample into a 100 ml beaker.
2. Add 50 ml of the 0.01 mol/L CaCl_2 -solution (V/V ratio of soil to liquid should be 1:2.5).
3. Add the stir bar to the mixture and put the beaker on the stirrer.
4. Let the mixture stir for 15 minutes (ideally 1 hour, but due to time reason we reduced the time to 15 min)
5. Allow the solid particles to settle for approximately one minute.
6. Measure the pH with your pH-meter.

Potential pH: _____

Used sample: _____

Method actual pH:

1. Put 20 ml of your sieved (2 mm) soil sample into a 100 ml beaker.
2. Add 50 ml of deionized water (V/V ratio of soil to liquid should be 1:2.5).
3. Add the stir bar to the mixture and put the beaker on the stirrer.
4. Let the mixture stir for 15 minutes (ideally 1 hour, but due to time reason we reduced the time to 15 min)
5. Allow the solid particles to settle for approximately one minute.
6. Measure the pH with your pH-meter.

Actual pH: _____

Used sample: _____

Delta pH: actual pH – potential pH: _____

Discuss possible problems of your sample with your lab partner! Are there any possibilities to improve the soil quality in respect of actual and potential pH?

pH Testing – Practical Work



Protocol – Interpreting Data

Part on pH Testing of a student's protocol:

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2) pH-Testing

2.1) Tools and material:

100ml beaker, CaCl₂-solution, stirrer, pH-meter, deionized water

2.2) Basics

It is important to know the pH of your soil because you should not fertilize soil, which is too acidic. To get the potential pH you should mix the soil with CaCl₂ solution and if you want to get the actual pH you must add deionized water when you have mixed them you can measure the pH level.

2.3) Execution

Please follow the work instruction on the paper.

2.4) Disposal

The soil sample is disposed in a bucket.

2.5) Results:

Sample 20-30cm

Potential pH: 4,16

Actual pH: 4,38

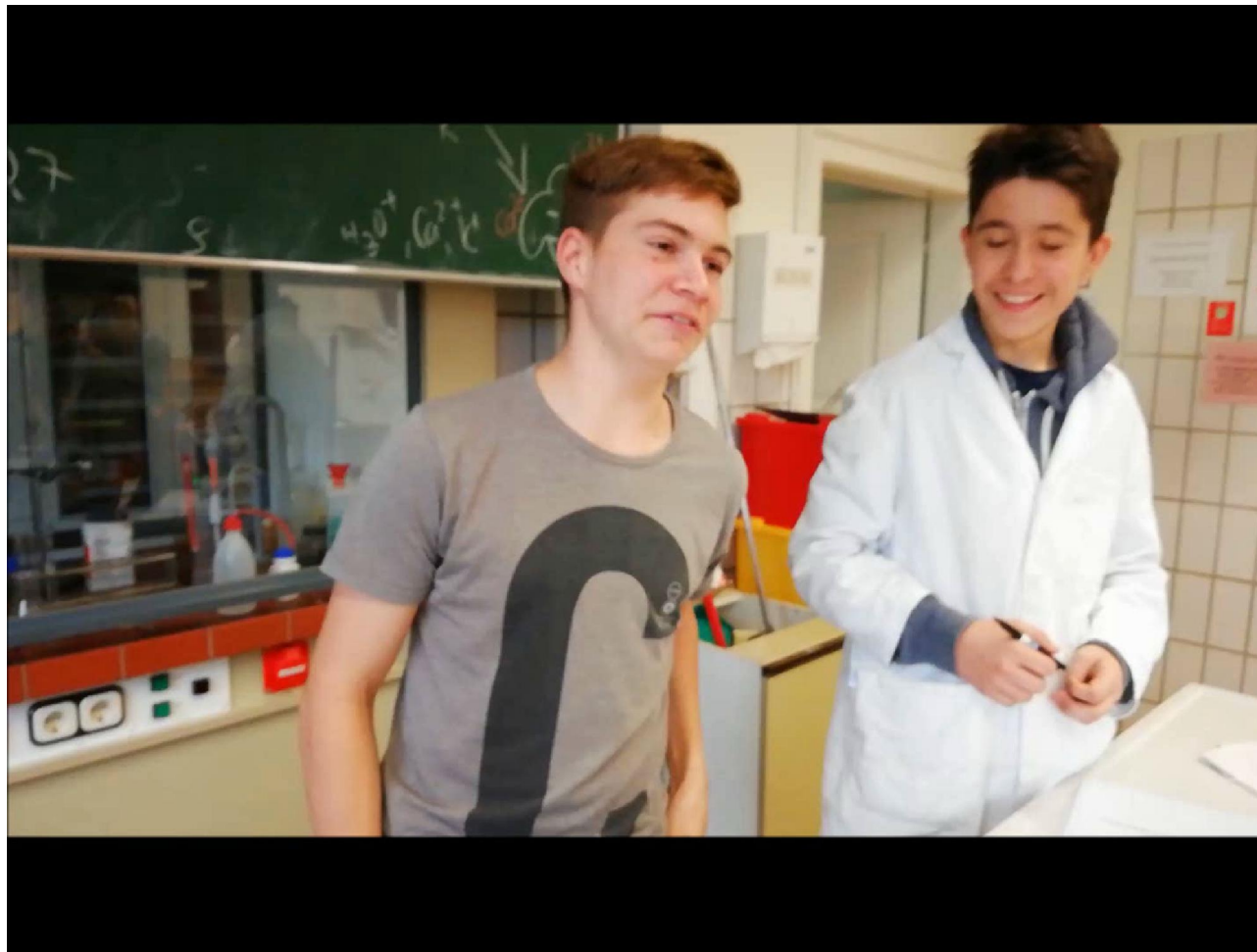
Delta: pH-actual-potential: 0,22

The soil is sour!

Fertilizing can lower the pH further. If you want to rise the pH, you should carbonate the soil!

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Feedback



Feedback



Feedback

