

## Summary

# Struvite from urine



### Target age

Age 14 and over

### Level of difficulty

Medium



### Key words:

*Nutrient recovery, Urine, Wastewater, Colorimetry, Fertilizer, Circular economy, Chemistry, Experimental design*








### Abstract of the activity:

*Urine contains valuable nutrients like ammonium and phosphate which we flush away as waste through the toilet. During the purification of wastewater, 70% of the energy is used for the removal of nitrogen/ammonium and phosphate. Ammonium is broken down to nitrogen during wastewater treatment and discharged into the environment. Phosphate is bound by bacteria in wastewater treatment plants and converted into sludge. The sludge will be burned as waste, while phosphorous is mined constantly to produce fertilizer and recovering phosphorus from mines is finite.*

*Wetsus investigates possibilities to recover nutrients from wastewater in order to establish a circular economy. From nutrients in urine we can make a fertilizer; struvite. Struvite is a mineral composed from ammonium, phosphate and magnesium and can be easily made from urine.*

*In this toolkit the students will learn about the importance of resource recovery (module 1), make their own struvite from urine (module 2), determine the concentration (module 3). In an extra module (module 4) they can create an experimental design to test their struvite or different recipes/sources for struvite.*

## Summary

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|---|---|
|    | <p><b>Learning Goals</b></p> <ul style="list-style-type: none"> <li>• Have basic knowledge of the nitrogen and phosphate cycle as a result of human activity.</li> <li>• Understand the importance of a more sustainable way of recovering these resources.</li> <li>• Have basic knowledge of the chemical principles of making struvite and colorimetric phosphate determination.</li> <li>• Set up an experimental design to test their struvite and interpret the results.</li> </ul> |
|    | <p><b>Specific Abilities</b> - <i>At the end of the activity the student will be able to:</i></p> <ul style="list-style-type: none"> <li>• Make struvite out of urine</li> <li>• Perform a colorimetric determination and calculations</li> <li>• Make an experimental design about struvite</li> </ul>   |
|  | <p><b>Cross-curricula Links</b></p> <ul style="list-style-type: none"> <li>• Ecology/Environment</li> <li>• Biology</li> <li>• Chemistry</li> <li>• Geography</li> <li>• Physics</li> <li>• Technology – experimental design</li> </ul>   |
|  | <p><b>Prerequisites</b> -</p> <ul style="list-style-type: none"> <li>• Be able to calculate with mols/grams/molecular weight</li> <li>• pH measurements</li> </ul>  |
|  | <p><b>Time requirement</b></p> <p><input type="checkbox"/> 4-5 h</p> <p><b>Extra experiment (growing peas): up to 21 days</b></p>   |

## Summary

### Learning and Teaching Support Materials - What you can find in the toolkit



1. Teachers' Card
2. Modules 1-4 with lab procedures
3. Students' Cards with lab procedures and evaluation form

RM  
Ambassadors

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