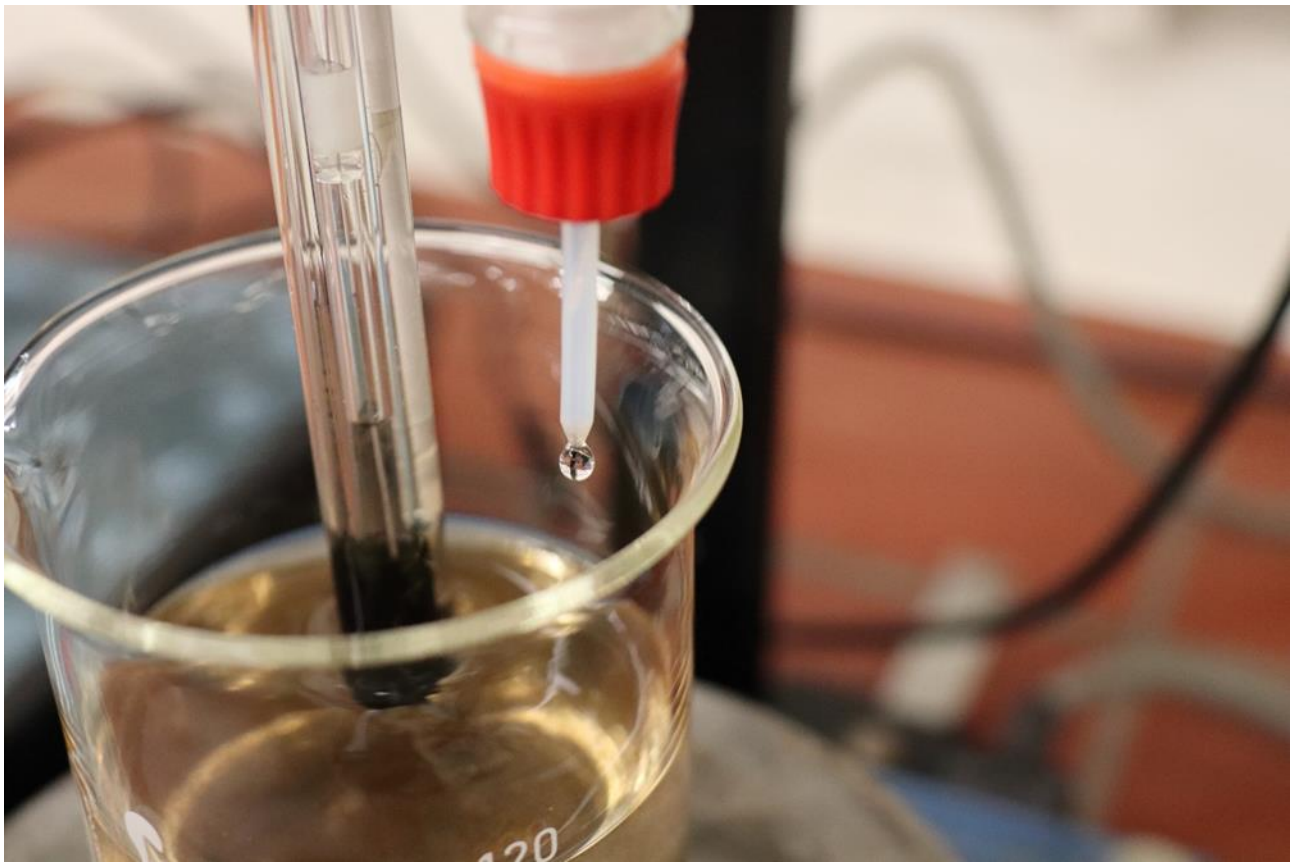
Summary

Removal of heavy metals from wastewater, e.g. chemical precipitation in the automotive industry



Target age

Age 16 and over

Level of difficulty

☐ Easy Medium X High

Key words:

Clean water technology, phosphating bath, automotive industry, critical analysis and interpretation of results

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Summary

Abstract of the activity:

In the automotive industry, car bodies are immersed in phosphating baths to protect them from corrosion. In aqueous solutions, the main components of which are $Zn^{2+}, Mn^{2+}, Ni^{2+}$ and phosphate, chemical reactions create a thin layer that significantly slows down corrosion and at the same time makes painting easier. However, before the car bodies enter the paint shop, they have to be rinsed off, which carries heavy metals into the rinsing water. Content: The course carries out the heavy metal hydroxide precipitation in a model experiment on manganese and, after filtering off the mixed precipitate of $Mn(OH)_2, MnO(OH), MnO_2$ a qualitative negative detection. The background information puts this example into a wider context.

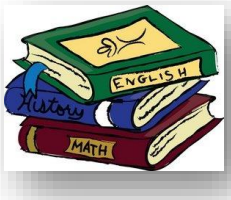
Learning objectives *(max 250 characters)*

- Understand the precipitation of heavy metals
- Clean water technology and its implications in this case; as a result you get a sludge by-product, which is toxic and has to be disposed.

Specific skills - *At the end of the activity the student will be able to:*

- Carry out a titration correctly and interpret the results
- Give the chemical formula of different precipitation routes
- Critically analyse and interpret a result obtained

Cross-curricula Links-



- Ecology/Environment
- Chemistry: precipitation, Lewis acid, redox reaction,

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Prerequisites - *Knowledge and skills necessary required to perform the activity*

- Basic principles of inorganic chemistry
- Basic stoichiometric principles
- Laboratory techniques (solution preparation, titration and filtration)

Time required *plus any other constraints (e.g. Instruments)*

From 4 h to several days, if it includes a visit to a waste water treatment plant

Instruments*: pH meter, laboratory balance,*

Learning and teaching aids - What you will find in the toolkit

1. Lab Procedure/s- Modules 1-3
2. Students' Cards (1-3)
3. ppt presentation for preparing a lesson (plus a short text)
4. example of a dissemination product created by students after this activity from the first version, held during projects days at Gymnasium Fallersleben, Wolfsburg, including complexometric titration

RM Ambassadors

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