Name of the project:	**Digitization of chemistry experiments to improve the quality and support chemistry teaching in secondary schools**
Acronym:	**ChemIQSoc**
Project number:	**2021-1-SK01-KA220-VET-000027995**

Co-funded by the Erasmus+ Programme of the European Union

Tittle: Crystallisation of oxalic acid

Work instructions

Task: Crystallise oxalic acid from its aqueous solution.

Theory

Oxalic acid (HOOC-COOH) is the simplest dicarboxylic acid. It is a white, relatively water-soluble substance. It forms nicely developed rectangular crystals. They can be obtained by very slow cooling of a supersaturated solution.

The advantage of this experiment is its low consumption of chemical, since the crystallised oxalic acid can be reused, also for further experiments.

Equipment: beaker 500 ml, laboratory spoon, glass rod, electric cooker, distilled water

Chemicals: oxalic acid dihydrate

Procedures:

1. Pour 250 ml of distilled water into a 500 ml beaker.
2. To this beaker add about 31.5 g of oxalic acid dihydrate with a spoon. Wait for some of the solid chemical to dissolve and then slowly heat the solution.
3. When all of the oxalic acid has dissolved, add the 31.5 g of solid oxalic acid dihydrate again. Then wait until this proportion has also dissolved.
4. Stop heating and place the beaker in a safe place, preferably inside a laboratory bench.
5. Allow to crystallise freely for at least three days.
6. When this process is complete, observe the transparent crystals that have formed. Most of them are rectangular in shape and you can pick them out with tweezers on a colored pad to see their shape.

Management of chemical substances

Chemicals	Form	H-statements	P-statements
$C_2H_2O_4 \cdot 2H_2O$	Solid	H302 + H312, H318	P280, P305 + P351 + P338

Sources of risk and assessment of risk severity

Oxalic acid is harmful if swallowed or in contact with skin, eye damage may occur. There is a possibility of scalding and sunburn.

Waste management method

Certified chemical waste disposal company.

Risk reduction measures

Lab coat, goggles, gloves.

Worksheet

Calculations

1. Calculate how many g of oxalic acid dihydrate are obtained by cooling a saturated solution from 65° to 20°C.
   s(65°C) = ... g substance/100 g water, s(20°C) = ... g substance/100 g water

Observation

1. Describe the appearance and odour of prepared oxalic acid.

2. Search for the basic physicochemical of oxalic acid .

Feature	**Value**
Solubility in water	
Solubility in other solvents	
Melting point	

Questions

1. Explain the importance of slow cooling in the crystallization of oxalic acid.

2. Suggest how you would verify the purity of the crystallized oxalic acid.

3. Explain why oxalic acid can be reused after crystallization.

4. Write what factors affect the shape and size of oxalic acid crystals.

5. Explain why oxalic acid is dihydrate and what effect this form has on its crystallization.

6. Write why oxalic acid dissolves better at higher temperature and how this property affects the crystallization process?

Conclusion

Instructions to elaborate conclusions:

1. Briefly summarise the aim of the demonstration experiment. What was the experiment trying to find out or prove?
2. Describe what you observed during the experiment. What were the most important results and what connections did you notice?
3. Explain the results using theory. How do the results confirm or refute the assumed principles?
4. Think about the practical meaning. How can the findings from the experiment be used in real life or in further study?

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