



<b>Title</b>	Preparation and determination of the concentration of the gardener's solution
<b>Subject</b>	Practical work, preparation of molar concentration solution
<b>Grade Level</b>	9th grade, lesson on preparation of molar concentration solution
<b>Duration</b>	45 min
<b>Objective(s)</b>	<ol style="list-style-type: none"><li>1. Prepare a 0.4mol/L <math>\text{CuSO}_4 \cdot 5\text{H}_2\text{O}</math> solution.</li><li>2. Make 0.2mol/L, 0.1 from the prepared solution by dilution mol/Lconcentration solutions</li><li>3. Colorimetric after downloading Color Grab or Color Picker apps method to determine the concentration of the tested solution (its color intensity compared to the produced solutions of known concentration)</li></ol>
<b>Pedagogical Methods</b>	Practical work
<b>Structure</b>	<p>Practical work. Preparation and determination of the concentration of the gardener's solution</p> <p>Copper sulfate is a widely used tool for protecting gardens and ornamental plants from diseases. It is recommended to treat plants with copper sulfate for the prevention of such symptoms: chlorosis (discoloration of leaves, shoots, stems), deformations, spots, leaf fall, drying, necrosis (death of tissue or plant parts, blackening), etc. It is used to increase the resistance of fruit trees, berry plants, flowers and some vegetables to adverse environmental factors, to stop the growth of moss and lichen on fruit trees.</p> <p>The problem: <i>How to use 500 ml of copper sulfate solution of unknown concentration? How to determine its concentration and make a gardener's solution from it to spray fruit trees?</i></p> <p>The goal: <i>Determine the concentration of the unknown solution using the colorimetric method</i></p> <p>The objectives:</p> <ol style="list-style-type: none"><li>1. Prepare a 0.4mol/L <math>\text{CuSO}_4 \cdot 5\text{H}_2\text{O}</math> solution.</li><li>2. Make 0.2mol/L, 0.1 from the prepared solution by dilution mol/Lconcentration solutions</li><li>3. Colorimetric after downloading Color Grab or Color Picker apps method to determine the concentration of the tested solution (its color intensity compared to the produced solutions of known concentration)</li><li>4. Calculate and determine the area of trapezoidal and rectangular plots the volume of gardener's solutions they need</li></ol> <p>Hypothesis:</p> <hr/> <hr/> <hr/> <p>Resources:</p> <hr/> <hr/> <hr/>



Theoretical questions:

1. Why is it important to use a  $\text{CuSO}_4$  solution of unknown concentration? What do the warning labels mean?

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2. What method did you use to determine the concentration of the colored solution?

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3. What is copper sulfate solution used for?

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Workflow/Results:

1. Calculate how many g of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  need to be weighed to prepare 100ml of a 0.4mol/L  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  solution.

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$$n = V \cdot c$$

$$M(\text{CuSO}_4 \cdot 5\text{H}_2\text{O}) = \dots\dots\dots$$

$$m = n \cdot M$$

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2. Weigh.....g of blue stone.
3. Pour the material through a funnel into a 100ml measuring flask.
4. Add 1/3 of the flask's volume of water through the funnel and mix the solution in a circular motion.
5. Add water up to the mark.
6. 6. By the dilution method, using a measuring cylinder, add 40ml of the solution from the prepared solution to a conical flask, add the same amount of water to the same conical flask, the concentration of the resulting solution is 0.2mol/L. Plan and prepare 80ml of 0.1mol/L-conc. solution from 0.2mol/L.

Progress: 1)

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2)

7. Compare the color intensity of the obtained solutions with the color intensity of the tested solution using the Color Grab or Color Picker app. Write down the RGB color codes

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8. What is the mol/L concentration of the test solution?

Answer:

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Conclusion:

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<b>Materials/Resources</b>	Chemical containers (measuring flasks, funnels, scales, measuring cylinders), distilled water and copper sulfate, a prepared solution with a concentration of 0.3 mol/L in a flask, the concentration of which must be determined.
<b>Pre-requisites</b>	Students have already downloaded the Color Grab and Color picker apps to their smartphones and know how to use them
<b>Activities &amp; Procedures</b>	<p>Presenting problem. How to use 500 ml of copper sulfate solution of unknown concentration? How to determine its concentration and make a gardener's solution from it to spray fruit trees?</p> <p>Purpose. Determine the concentration of the unknown solution using the colorimetric method</p> <p>Students prepare a 0.4 mol/L conc solution according to the instructions, dilute it to 0.2 and 0.1 mol/L.</p> <p>According to the change in the prepared colors, determine the conc of the unknown solution.</p> <p>Self-assessment: <a href="https://padlet.com/laimasab/chemija-9kl-hnyo4ehsx7c83pbe?fbclid=IwAR1NUiNwaB5LnPkCSqeYZjxUWkfROqj0z-jWh3flzeGPcK_WBILIToiQPwM">https://padlet.com/laimasab/chemija-9kl-hnyo4ehsx7c83pbe?fbclid=IwAR1NUiNwaB5LnPkCSqeYZjxUWkfROqj0z-jWh3flzeGPcK_WBILIToiQPwM</a></p>
<b>Assessment/Evaluation</b>	Student work is assessed by cumulative assessment
<b>Extensions/Modifications</b>	It is possible to integrate math problems and extend the lesson. It is possible to integrate with biology and talk about the use of blue stone in horticulture.
<b>Additional Notes</b>	
<b>Attachments/Links</b>	