Dofinansowane przez
Unię Europejską

ERASMUS+ PROJECT "Developing Selected Key Competences of Students During School and Extracurricular Activities"

No. 2024-1-PL01-KA220-SCH-000247484/2

DEMONSTRATION LESSON PLAN IMPLEMENTED UNDER THE ERASMUS+ PROJECT

"Co-funded by the European Union. The views and opinions expressed are solely those of the author(s) and do not necessarily reflect those of the European Union or the Foundation for the Development of the Education System. Neither the European Union nor the Foundation for the Development of the Education System can be held responsible for them."

SUBJECT: Chemistry
CLASS: 8
LEAD TEACHER: Miriam Kowzan-Tsymbal (LT)
CO-TEACHER: Agnieszka Kowalik (CO-T)
SCHOOL NAME: Primary School in Perły
LESSON TOPIC: Electrolytes and Non-electrolytes. Determining the pH of a Solution.
LESSON DURATION: One lesson (45 minutes)

GENERAL OBJECTIVES:

- The student learns about electrolytes and non-electrolytes.
- The student learns about acid-base indicators and the pH scale.

SPECIFIC OBJECTIVES:

- The student learns which compounds are electrolytes and which are non-electrolytes.
- The student investigates the phenomenon of electrical conductivity in electrolytes.
- The student learns about various acid-base indicators such as universal litmus papers, phenolphthalein, and methyl orange.
- The student learns to recognize different pH values on the pH scale.

KEY COMPETENCES:

- Competence in understanding natural sciences:
    - The student understands the phenomenon of electrical conductivity in electrolytes.
    - Applies chemical knowledge to explain phenomena occurring in the environment and technology.
    - The student can measure the pH of various substances using different indicators.
    - Knows pH indicators found in nature.
- Social competences:
    - The student works in a group, shares tasks, and respects others' opinions.
- Competence in understanding, processing, and presenting information:
    - The student can use acquired information to conduct an experiment and then present the results.

TEACHING METHODS:

- Discussion
- Expository – demonstration of the experiment
- Pair work
- Practical exercises – conducting the experiment
- Experimental method
- Elements of formative assessment

TEACHING MATERIALS:

- Textbook
- Multimedia board

- Chemistry experiment table
- Aqueous solutions: vinegar, lemon, dissolved sugar, dissolved salt, sulfuric acid (IV), potassium hydroxide, dissolved gelatin, dissolved baking soda, milk, soap, dishwashing liquid, dissolved electrolytes, water, distilled water, glycerin, tea essence, lemon, beetroot juice.
- Laboratory glassware: beakers, test tubes, glass and plastic pipettes, stirring rod, wooden clamps.
- Protective clothing: gloves, lab coats (if needed)
- pH indicators: universal litmus papers, methyl orange, phenolphthalein.
- Galvanic cell
- Experiment worksheets
- Paper flowers
- Note for the notebook – division of substances into electrolytes and non-electrolytes.
- Access to chemical experiment recordings from the Nowa Era platform
- Watermelon

LESSON FLOW

Introduction (3 minutes, LT/CO-T):

- Greeting students
- Introducing the lesson topic by asking thought-provoking questions:
    - "Have you ever wondered why batteries conduct electricity?"
    - "How is it that batteries store energy?"
    - "What comes to your mind when you hear the word ELECTROLYTES?"
- Writing the lesson topic: "Electrolytes and Non-electrolytes. Determining the pH of a Solution."
- Discussing the lesson objectives (NACOBEZU - it's polish expression which says: What do you need to pay attention to?):
    - What are electrolytes and non-electrolytes?
    - What are acid-base indicators?
    - What pH do different solutions have?

Development (7 minutes, LT/CO-T)

- Explanation of what electrolytes and non-electrolytes are
- Showing a video:

    - Experiment 31 – "Investigating the phenomenon of electrical conductivity in aqueous solutions." (2 min)
- Note for the notebook – division of substances into electrolytes and non-electrolytes
- Demonstration of measuring electrolytes in watermelon using a galvanic cell (optional)

Teacher's notes:

The lead teacher introduces the topic while the co-teacher prepares laboratory equipment on the experiment table (beakers, 5 glass and 10 plastic pipettes, 5 stirring rods, protective gloves, 30 test tubes, 3 test tube racks, wooden clamps), pH indicators (universal indicator papers, phenolphthalein, and methyl orange), and 100 ml of various solutions (listed in materials) for pH measurement experiments. The solutions should be divided into acidic, neutral, and basic, e.g., by placing cards with the names: basic, acidic, and neutral.

Practical Part (20 min, LT/CO-T)

- Theoretical introduction – types of reactions and indicators for pH measurement – note on the board, which students will complete after the experiments.
- Students form pairs
- They receive a worksheet to fill in.
- Task discussion with students.
- Students measure the pH of 3 selected substances with 3 different reactions. They fill in the worksheet during the process.

Teacher's notes:

While students are performing the task, the lead and supporting teachers assist and provide guidance if needed. It is important that the students work independently. Special care should be taken with acid and base solutions.

Summary and evaluation (10 min, LT/CO-T)

- Joint discussion of results.
- Cleaning up the workstation.
- Writing conclusions in notebooks – completing the previously started note.
- Curiosity – indicators found in nature.
- Additional task – ask students to find other examples of natural indicators. For repeated names, 2 flowers. For a unique name, 5 flowers.
- At the end, students can freely measure electrolytes using a galvanic cell.

- Students fill out a form in which they evaluate the lesson.

GUIDELINES FOR WORKING WITH STUDENTS WITH DIVERSE DEVELOPMENTAL NEEDS

- Each student works at their own pace and receives help from the teacher if needed.
- The supporting teacher pays special attention to whether the student on the autism spectrum understands the instructions and keeps up with the lesson. Ensure she knows what to do and, if necessary, repeat individual steps.
- Students with dysgraphia, dysorthography, and dyslexia – while writing notes in the notebook, teachers check the correctness of the written content and encourage correct, legible writing.
- Teachers ensure that all students understand the instructions.

BIBLIOGRAPHY:

- Kulawik J., Kulawik T., Litwin M., "Chemia Nowej Ery. Podręcznik dla klasy 7 szkoły podstawowej", Nowa Era, Warsaw.

pH MEASUREMENTS – CHECKING INDICATORS

1. Choose one substance from each reaction: neutral, acidic, and basic.
2. Write the names of the selected substances in the first column along with their reaction.
3. Choose the types of litmus papers you will use for measurements. Write their names in the table.
4. Measure the solutions with litmus papers. Just dip the litmus paper in the selected solution. Remember, you can use one paper for one measurement.
5. Then, using pipettes, take small amounts of the selected substances into test tubes. Remember to use a glass pipette for strong acids and bases.
6. Add a few drops of methyl orange to each test tube.
7. Observe the color change and record the result in the table.

8. Repeat steps 4–6 with phenolphthalein.

Note! Remember to put on protective gloves before performing the experiment. Hold test tubes with acids and bases with a wooden or metal clamp.

INDICATORS → / NAME OF THE ↓ SUBSTANCE	Universal litmus papers ....(write those you use)	methyl orange	Phenolphthalein