

GOOD PRACTICE EXAMPLE · GRADE 9–10 · CHEMISTRY & ENVIRONMENTAL PROTECTION

Visualization of Chemical Processes Using AI

Making the invisible molecular world visible, one AI-generated diagram at a time

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About the Lesson

Teacher, school, subject, grade and duration



Learning Objectives

What students should be able to do afterward



Lesson Flow

Five phases - from a single AI image to a student-built visualization



AI in Action

The AI prompts and visualizations behind each phase of the lesson



Results & Reflection

What the lesson showed and why it was selected

About the Lesson



TEACHER

Mariyana Georgieva



SCHOOL

134th SU “Dimcho Debelyanov”, Sofia,
Bulgaria



SUBJECT & TOPIC

Chemistry - Visualization of Chemical
Processes Using AI



GRADE

9th–10th grade



DURATION

40 minutes



CURRICULUM LINK

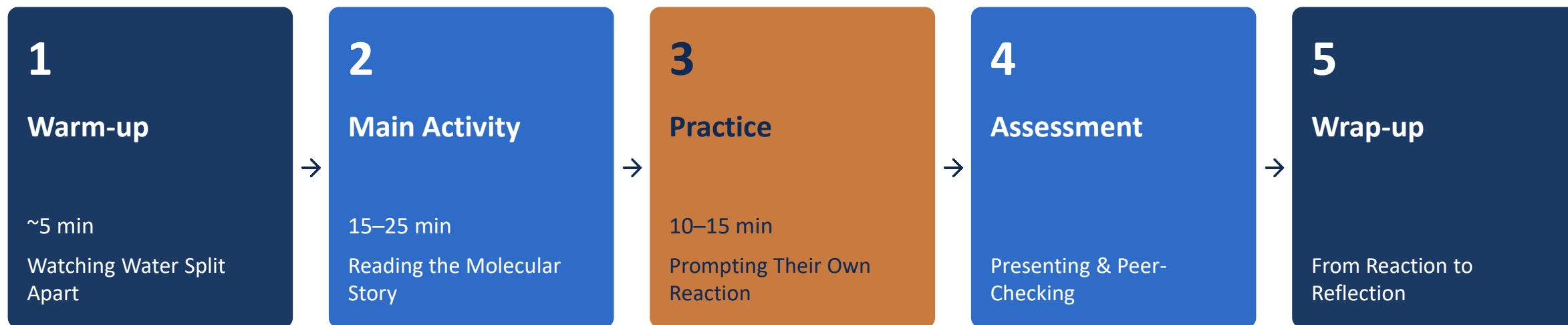
Visualizing chemical reactions at the
molecular level; digital competencies



What Students Achieve

- 1 Students to explain how chemical processes occur at the macro- and microscopic level.
- 2 To use AI tools to create and analyze visualizations of chemical processes.
- 3 To connect the visual representation of chemical reactions with chemical equations.
- 4 To develop skills for critically evaluating AI-generated scientific images.

Lesson Flow - Five Phases



One AI tool, ChatGPT, carries every phase of this 40-minute lesson — from the opening image to the closing homework.



ONE AI TOOL · FIVE INVISIBLE REACTIONS

Seeing What Molecules Do

What follows: how each of the five phases actually unfolded in Mariyana Georgieva's classroom.

Watching Water Split Apart

Tool: ChatGPT

The teacher shows an AI-generated image of the water electrolysis process and asks: “What happens to the water molecules during this process?” Students share their assumptions.



No explanation comes first - only the image and the question. Whatever the class gets wrong here is exactly what the rest of the lesson sets out to fix.

Prompting the Opening Image

Tool: ChatGPT

The exact prompt behind the lesson's opening image:

” *Create an educational scientific illustration of the water electrolysis process, suitable for 10th grade students, with hydrogen and oxygen clearly labeled.*

The real prompt used by the teacher to generate the water electrolysis illustration



PHASE 2 · MAIN TEACHING ACTIVITY (15–25 MIN)

Reading the Molecular Story



Connecting Image to Equation

Students analyze the AI-generated visualizations and connect what they observe with the chemical equation.



What Makes It Click

They discuss which elements of the visualization aid understanding of the process.



Correct vs. Inaccurate

They compare a scientifically correct and an inaccurate visualization and find the errors.



AI IN ACTION · PRODUCT FROM THE LESSON

Two Prompts, Two Diagrams

Tool: ChatGPT

Purpose of using AI: creating visual models of chemical processes that support understanding of abstract concepts and molecular interactions.

” *Create a scientific diagram of water electrolysis with labeled products and ion movement.*

Prompt used for the water electrolysis diagram

” *Generate an educational visualization of a redox reaction for 10th grade students.*

Prompt used for the redox reaction visualization

Studying What You Cannot See



A chemical reaction happens between atoms and ions no one can actually watch. By comparing a scientifically accurate AI visualization against an inaccurate one, students learn to question what they see - and AI becomes a tool for studying processes that are otherwise invisible at the molecular level.



Compare

Line the AI image up against a scientifically correct one.



Question

Find exactly where the two visualizations disagree.



Understand

Use the fix to reason about what's really happening.



PHASE 3 · PRACTICE AND APPLICATION (10–15 MIN)

Prompting Their Own Reaction

Tool: ChatGPT

Working in pairs, students choose a chemical process — electrolysis, combustion, neutralization, corrosion, etc. - formulate their own prompt with ChatGPT, and analyze the resulting image. Then they present what it shows and how scientifically accurate it is.



Ready-Made Prompts

Students with lower preparation are given ready-made prompts to work from.



Build Your Own Prompt

Advanced students create their own prompts and evaluate the scientific accuracy of the visualizations.

Pair work with assigned roles.

Students in Action



Presenting & Peer-Checking



Method

Observing participation in the discussion. Analysis of the presented visualizations. Oral presentation of the chemical process. Self-assessment and peer assessment between groups.



AI support

ChatGPT assists in creating assessment criteria, generating questions for analyzing the visualizations, and preparing a rubric for assessing scientific accuracy and quality of presentation.



Evidence of learning

The student correctly explains the chemical process and connects the visualization with the chemical equation - recognizing inaccuracies in AI-generated images and arguing the scientific accuracy of the visualization.

What Remains After the Lesson



Generated with AI

- Images and scientific diagrams of chemical processes
- Analysis questions and worksheets
- A presentation created with Canva AI



Also used

- ChatGPT and Canva, as digital tools
- Chemistry textbook, notebook and periodic table
- Worksheets and chemical models and diagrams



From Reaction to Reflection

Discussion: students present their visualizations and discuss which elements best support understanding of the chemical process. The teacher summarizes the role of visualization in studying chemistry and emphasizes the need to verify AI-generated images for scientific accuracy.

Homework: choose a chemical process studied in chemistry class and create a visualization with the help of AI. Describe the process in 5–6 sentences and indicate which elements of the image best represent the reaction taking place.

TEACHER REFLECTION

” *The use of AI visualizations increased students' interest and engagement.*

They demonstrated better understanding of molecular-level processes and actively participated in analyzing the scientific accuracy of the images. It is necessary to continue working on developing skills for critically evaluating AI-generated content.

— **Mariyana Georgieva**

Why We Chose This Lesson



Making the Invisible Visible

AI turns molecular-level events - the kind no one can actually watch happen - into images students can look at, question, and correct.



Error-Spotting Built Into the Lesson

Comparing a scientifically correct visualization against an inaccurate one turns image-checking into a core skill, not an afterthought.



A Prompt for Every Student

Ready-made prompts for those who need them, open prompt-writing for those ready to test their own ideas - every student works with AI, not just watches it.

Thank you for your attention!

Lesson: Visualization of Chemical Processes Using AI · Mariyana Georgieva, 134th SU “Dimcho Debelyanov”, Bulgaria