



TASK OVERVIEW

MIDDLE SCHOOL PHYSICAL SCIENCE: WE'RE RUNNING OUT OF GAS!

Three-Dimensional Claim

In this task, students will evaluate claims about the physical and chemical properties of matter while applying their knowledge of patterns in the properties of matter (the periodic table).

■ Disciplinary Core Ideas ■ Crosscutting Concepts ■ Science and Engineering Practices

Tennessee Academic Standards for Science

This task is intended to elicit student learning of the following Tennessee Science Standard:

7.PS.1.5: Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.

Next Generation Science Standards

This task is intended to elicit student learning of the following NGSS elements for each of the three dimensions:

Science and Engineering Practices

Engaging in Argument From Evidence

- *Middle School Element:* Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- *Middle School Element:* Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.

Crosscutting Concepts

Patterns

- *Middle School Element:* Macroscopic patterns are related to the nature of microscopic and atomic-level structure.
- *Middle School Element:* Graphs, charts, and images can be used to identify patterns in data.



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	STRENGTHS	OPPORTUNITIES FOR IMPROVEMENT
SCENARIO	The task is compelling and intriguing. It provides a context with an authentic problem to solve (“The world is running out of Helium gas”), making it interesting to think about a useful substance being lost from Earth’s system.	It may help to make this task more meaningful if users provide information about the uses of Helium beyond balloons in the scenario.
SENSE-MAKING	Students have to make sense of why the properties of helium make it useful for particular purposes and then figure out whether the properties of other substances also work for those purposes. The final question asks students to support the claim that no one gas will be able to replace helium for all of its uses with evidence and reasoning provides the main sense-making opportunity that gets at the scientific “why” of the replacement issue.	None.
INTEGRATED DIMENSIONS	Prompts integrate dimensions and are well designed to elicit evidence of students understanding of each dimension. Students make sense of the uses of helium and then use the given information to support or refute claims that other gases can replace helium.	None.
EQUITY	The task is coherent from the student’s perspective and the prompts build well on each other toward the culminating question.	Writing is the primary way students respond to the task. Some students may benefit from added choice in the assessment or additional options for responding to prompts.
FEEDBACK SUPPORT	The task elicits artifacts of how well students can use the targeted dimensions (in the task in rubric more so than the three-dimensional claim) together to make sense of substituting gases for helium.	The rubric would benefit from being updated with actual student responses after it is piloted in a classroom.



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Suggestions for Use

This task would best be used as a summative assessment to reveal student progress in their knowledge of the properties of matter (and the arrangement of the periodic table and the relationship between properties and atomic structure), as well their ability to support an argument with evidence. Alternatively, with some adjustments and additions, this task could be used as instructional support as students first make sense of the properties of matter.

What Are The Major Takeaways?



SUMMARY POINTS

This strong task is well designed to elicit evidence that students can engage in three-dimensional sense-making. It also takes an area of chemistry that is notoriously difficult to find applications and asks students to engage in an interesting and uncertain problem. The task is coherent from the students' perspectives and builds toward a culminating argument.



SUGGESTIONS FOR IMPROVEMENT

The task could include an example of something that needs to be welded in Prompt 3 to make it more accessible for students who might not know anything about welding. It could also be improved by offering additional ways for students to respond to prompts.

What Should I Do Before Using This Task?

Users should review the [provided guidance](#) to familiarize themselves with instructions and disclosures before using these tasks.

How Were These Tasks Developed?

The tasks were developed and revised by teacher work groups from participating districts in the Tennessee District Science Network (TDSiN), which was launched in early 2019 and managed by NextGenScience. Tasks were evaluated using an adapted version of the Science Task Screener. Teachers worked collaboratively across districts to develop and revise these tasks after attending multiple professional learning sessions. Find out more about the development process [here](#).



NextGenScience, a project at WestEd, works alongside educators to design quality, coherent programs that align science standards, instructional materials, professional learning, and assessments.
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