

Close Reading and Text Dependent Questions in Science

Helium Not So Super After All (Physics – HS)

The text selection, *Helium Not So Super After All*, can be found at the following link:
<http://www.sciencenewsforkids.org/2012/11/helium-not-so-super-after-all/>

We apologize that we cannot include this reading directly; it is copyrighted material and we do not have special permissions that would allow us to post it publically. If you have difficulty accessing this article at the site above, please check the **Science Page of Aspen/SIS** for assistance accessing it.



Look in the Student Learning Outcome (SLO) Documents for guidance on when this should be taught. These can be found on the BPS Science Department's website: <http://bpsscience.weebly.com/> You will find the Student Learning Outcomes documents organized there by grade level.

Helium Not So Super After All (Physics – HS)

Student Questions

1. How does the article define a supersolid and why is discovering a supersolid so desirable for scientists?
2. How does the article define friction, and what is the usual by-product of friction that the article hints of in the example of “rubbing your hands together quickly”?
3. Give a brief outline of the experimental procedure used in the research and identify the part of the research where the results thrown off?

Science and Technology/Engineering

4. How does the picture and accompanying caption included in the article illustrate how we typically encounter helium in our everyday lives?
5. What are the negative and positive points that resulted from the researchers' premature publication of the experimental results?

Helium Not So Super After All (Physics – HS) Sample Answers

- 1. How does the article define a supersolid and why is discovering a supersolid so desirable for scientists?**

Supersolids are materials that can flow without friction. Given what scientists know now, it is not possible to have a material that does not experience friction. There are possible applications for such supersolids.

- 2. How does the article define friction, and what is the usual by-product of friction that the article hints of in the example of “rubbing your hands together quickly?”**

Friction is the force that slows things down that are in contact with each other and moving past one another. Friction can cause heat, as demonstrated by the example of rubbing your hands together (friction) and your hands feeling warm.

- 3. Give a brief outline of the experimental procedure used in the research and identify the part of the research where the results thrown off?**

Helium, which is normally a gas, was cooled to a very low temperature so that it was in a solid form. The solid helium was then put into a glass cylinder and a device was used to twist the cylinder one way and then the other, reversing directions 1,000 times per second. When the temperature was lowered further it was found that the cylinder was twisting faster. The scientists mistook this as an indication that the helium was supersolid, acting more like a liquid than a solid and flowing without friction. However, it was later discovered that this result was not due to any supersolid state of the helium, but rather a mistake in measurements caused by an issue with the glass cylinder that threw off the results.

- 4. How does the picture and accompanying caption included in the article illustrate how we typically encounter helium in our everyday lives?**

The sign is filled with helium gas that glows when an electric current passes through it. The helium we will typically encounter is a gas.

- 5. What are the negative and positive points that resulted from the researchers’ premature publication of the experimental results?**

The negative is that they needed to publish a report that refutes their former one, formally telling the scientific community of their error and that they did not indeed discover a supersolid. The positive is that this research may help pave the way to understanding strange phenomenon in physics, perhaps someday leading up to the discovery of a supersolid.