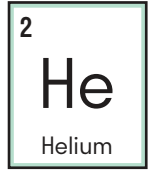


Extended Reading Comprehension:

Extraordinary Elements



Helium

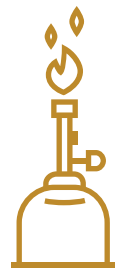


- 13** Like neon, helium is a noble gas. Its atomic number is 2, making it the second lightest element. Because helium weighs less than the surrounding air, balloons filled with helium float upward. But helium is not just for kids' party balloons. Airships called blimps rely on helium to give them shape and to fly. And the life-saving airbags in cars inflate so quickly because they are filled with helium.
- 14** When it comes to being cool, helium is the coolest—literally! Of all the elements, helium has the lowest melting and boiling points, -458°F and -452°F , respectively. This makes helium a valuable, stable coolant that is used in a multitude of applications; for example, it is used to cool the superconducting magnets in magnetic resonance imaging (MRI) machines, which allow physicians to look inside patients' bodies to detect and diagnose health conditions. Liquid helium also cools the particle accelerators that are used to create and discover new elements. Using helium this way may eventually allow the discovery of even more extraordinary elements.
- 15** Just as ancient philosophers tried to understand the natural world by defining the basic elements of matter and life, modern scientists look for answers by studying, experimenting with, and even creating new elements. The properties of these elements lend themselves to applications and new technologies that can improve our lives and help us understand the mysteries of the universe.

Answer the questions about “Extraordinary Elements.”

1. Part A: Which pair of adjectives best describes the overall tone of the passage?

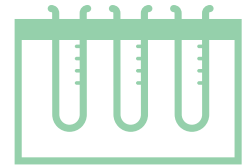
- A. solemn and formal
 B. grim and foreboding
 C. playful and informative
 D. urgent and intense



Part B: Describe how the author's choice of words and content reflects this tone. Cite specific examples.

The author includes interesting, fun content, like instant ice cream, spoons that bend, colorful crystals, and levitating magnets. The author also uses puns throughout the passage, playing with the fact that the word “cool” means “cold” but also “excellent” and “awesome.” For example, the author uses phrases like “Now, that’s definitely cool!” at the end of paragraph 4.

Extended Reading Comprehension: Extraordinary Elements



Keep going! Answer the questions about “Extraordinary Elements.”

2. Part A: Based on the text, how do scientists distinguish one element from another?

- A. by how many total atoms are needed to make a detectable whole
- B.** by the number of protons in the nucleus of each of its atoms
- C. by its state of matter at standard temperature and pressure
- D. by how tightly its atoms’ subatomic particles are packed together

Part B: What text evidence supports this answer?

“An element’s atomic number is determined by the number of protons in the nucleus of each of its atoms.”

3. Based on the text, how are gallium and bismuth similar? Choose two answers.

- A.** They are both nontoxic metals that can be used in place of more toxic elements.
- B. They both form iridescent crystals when melted and then supercooled very quickly.
- C. They are used in the same types of applications, including fire detectors and solar panels.
- D.** They both have melting points that are relatively low for metals.
- E. They are both rare, diamagnetic elements that form alloys often used in magic tricks.

4. Part A: The author focuses on five different elements and links them together with a common theme relevant to their real-world properties and/or applications. What is the theme?

Each element has at least one property or application that relates to how physically cold or cool it is or what happens when it is cooled.

Part B: Cite specific text evidence for each element to support your answer to Part A.

1. nitrogen: In liquid form, it is extremely cold and is used to flash freeze things.

2. gallium: Its melting point is lower than other metals', and it can stay liquid when supercooled.

3. bismuth: It doesn't conduct heat well, so things around it stay cool. Crystals form when it's slowly cooled.

4. neon: It is used as a coolant and helps keep expensive equipment and electronics from overheating.

5. helium: It is the coolest element, with the lowest melting and boiling temperatures. It is used as a coolant.

Extended Reading Comprehension: Extraordinary Elements



Keep going! Answer the questions about “Extraordinary Elements.”

5. Part A: What is likely true about the periodic table of elements?

- A. With the discovery of the heaviest element, oganesson, it is finally complete.
- B.** It is likely to change as scientists learn more about and discover new elements.
- C. It only includes elements that have been discovered in nature on Earth.
- D. Along with the four Greek elements, it includes a total of 122 distinct elements.

Part B: Cite textual evidence from the passage to support this inference.

1. The table on page 1 talks about the “known” elements, which suggests there are possibly unknown ones.

2. Paragraph 14 talks about particle accelerators being used to “create and discover” new elements.

6. Describe how the author uses figurative language to explain the behavior of the element neon.

The author compares neon to a person by saying it can “keep its cool’ in a crowd.” The text also says that neon doesn't mix with or “get into a frenzy” around other elements.
This personification of neon shows how neon is a nonreactive, very stable element.

7. Part A: Based on information in the text, what is likely true about nitrogen, neon, and helium?

- A.** Their pure liquid states do not occur naturally on Earth.
- B. They are all essential elements for human life on Earth.
- C. They are all in the same group of gases on the periodic table.
- D. They can be used interchangeably in most applications.

Part B: Summarize the textual evidence that supports your answer.

Nitrogen is a liquid between -346°F and -322°F , temperatures colder than anywhere on Earth. Neon becomes liquid at lower temperatures, between -415°F and -410°F , and helium even lower at -458°F . Therefore, it is unlikely that liquid nitrogen, neon, or helium ever occurs naturally on Earth.

8. Read the following inference.

Elements with higher atomic numbers are generally heavier than elements with lower atomic numbers.

Cite one piece of text evidence that supports this inference.

Hydrogen (atomic number 1) is the lightest element; helium's atomic number is 2, which makes it the second lightest.