Unusual Supernova Sheds Light on Heavier Element Fusion

Description

The energy from stars, like our Sun, comes from a process called nuclear fusion. In the star's core, hydrogen changes into helium, creating energy. A star can do this for millions or billions of years. When the hydrogen runs out, the star starts fusing helium into heavier elements like carbon and oxygen. It continues to change fuels until it reaches iron.

As these fusion processes happen, the star's layers change. In older stars, the outer layer often has leftover hydrogen. Inside, there are layers of helium, carbon, and oxygen, ending with an iron core.

When the star runs out of silicon and sulfur, fusion stops. This happens because fusing iron and heavier elements does not create energy. Low-mass stars, like our Sun, stop shining and become cinders. Heavy stars go through a supernova, a powerful explosion. Gravity takes over, collapsing the star's mass. The core becomes a neutron star or a black hole, while outer layers are blown away, possibly forming new stars or planets.

In 2021, a supernova named SN2021yfj surprised researchers. It showed all its layers had been expelled before exploding. Scientists are trying to understand how this happened.

Vocabulary List:

1. **nuclear** //ˈnuːkliəɹ// (adjective): about the center of an atom
2. **fusion** //ˈfjuːʒən// (noun): when two things join to make one
3. **supernova** //ˌsuːpərˈnoʊvə// (noun): a very large and bright star explosion
4. **collapsing** //kəˈlæpsɪŋ// (verb): falling inward quickly because of strong gravity
5. **expelled** //ɪkˈspɛld// (verb): sent out or thrown away from something
6. **neutron** //ˈnuːtrɑn// (noun): a small particle inside an atom's center

Comprehension Questions

Multiple Choice

1. What process produces energy in stars like our Sun?

   Option: Nuclear fission

Option: Nuclear fusion
Option: Chemical reaction
Option: Radioactive decay

2. What does hydrogen change into during nuclear fusion?

Option: Oxygen
Option: Helium
Option: Carbon
Option: Iron

3. What element does fusion stop at when a star runs out of silicon and sulfur?

Option: Hydrogen
Option: Helium
Option: Carbon
Option: Iron

4. What is the outcome for low-mass stars like our Sun when they stop shining?

Option: They become black holes
Option: They become neutron stars
Option: They become cinders
Option: They disappear completely

5. What is a supernova?

Option: A type of hydrogen fusion
Option: A powerful explosion of a heavy star
Option: A form of neutron star
Option: A layer of the sun

6. What did the supernova SN2021yfj show researchers?

Option: It had leftover hydrogen
Option: All its layers had been expelled before exploding
Option: It became a black hole
Option: It fused iron

True-False

7. Nuclear fusion can occur for only a few years in a star.

8. Heavy stars undergo a supernova when they run out of fuel.

9. The outer layers of older stars often contain helium.

10. Low-mass stars like our Sun eventually form new stars.

11. Fusing iron and heavier elements generates energy.

12. SN2021yfj is a supernova that surprised researchers.

Gap-Fill

13. The energy from stars comes from a process called nuclear _____ .

14. When hydrogen runs out, the star starts fusing helium into _____ elements.

15. The star's core becomes a neutron star or a black _____ after a supernova.

16. In older stars, the outer layer often contains leftover _____ .

17. When fusion stops, the core becomes an iron _____ .

18. Gravity collapses the star's mass, leading to a powerful _____ .

Answer

Multiple Choice: 1. Nuclear fusion 2. Helium 3. Iron 4. They become cinders 5. A powerful explosion of a heavy star 6. All its layers had been expelled before exploding
True-False: 7. False 8. True 9. False 10. True 11. False 12. True
Gap-Fill: 13. fusion 14. heavier 15. hole 16. hydrogen 17. core 18. explosion

CATEGORY

1. Sci/Tech - LEVEL2

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