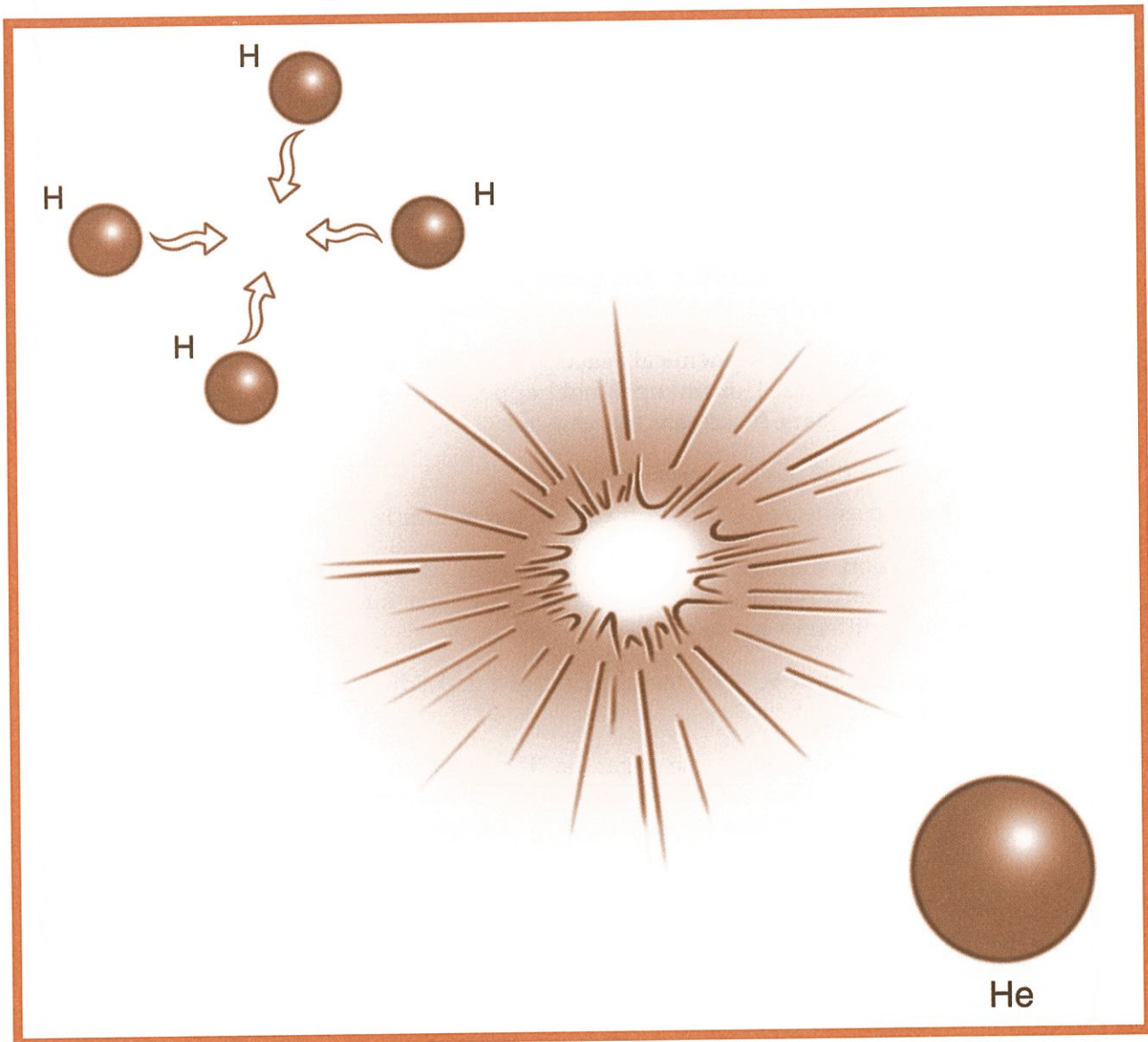


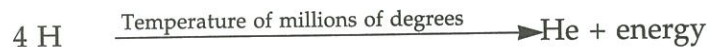
How do stars get their energy?

**KEY TERM**

fusion: joining together of hydrogen atoms to form helium atoms

UNDERSTANDING HYDROGEN FUSION

This is a nuclear equation.



It tells us that four atoms of hydrogen fuse to form one atom of helium—plus ENERGY

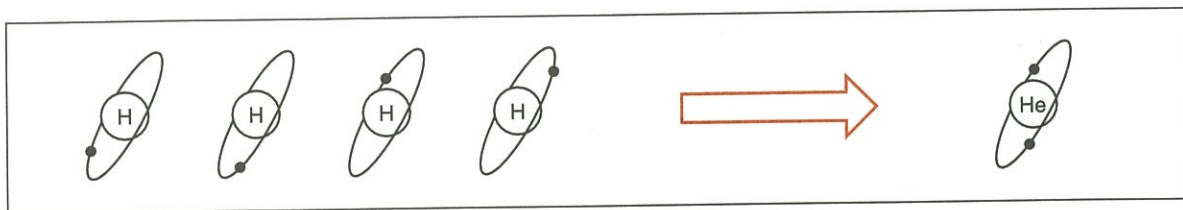


Figure A

Where does this energy come from?

Follow the explanation step-by-step.

- The atomic mass of hydrogen is 1.0081.
- The atomic mass of helium is 4.0039.

Four hydrogen atoms have a mass of 4.0324 atomic mass units (a.m.u.)

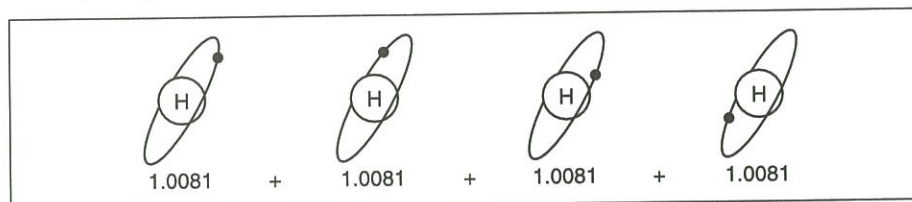


Figure B

$$4 \times 1.0081 = 4.0324 \text{ a.m.u.}$$

One helium atom has a mass of 4.0039

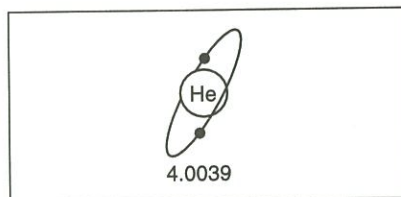


Figure C

We see that one helium atom weighed 0.0285 less than four hydrogen atoms.

$$\begin{array}{r} 4.0324 \text{ a.m.u.} \\ -4.0039 \text{ a.m.u.} \\ \hline 0.0285 \text{ a.m.u.} \end{array}$$

- It is this 0.0285 a.m.u. of matter that changes to energy.
- This reaction takes place trillions and trillions of times each second and powers stars.

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

burning
helium
hydrogen
chemical

four
nuclear
one
nuclei

oxygen
energy
fusion
light

1. Burning is a _____ reaction in which _____ links up with another substance.
2. The energy that powers stars is not caused by _____.
3. Stars get their energy from _____ reactions.
4. The kind of nuclear reaction that gives stars their energy is called _____.
5. Fusion joins the _____ of atoms.
6. The sun is made up mostly of _____.
7. Fusion on the sun joins atoms of hydrogen. _____ hydrogen atoms fuse to form _____ atom of helium.
8. _____ is nearly four times heavier than hydrogen.
9. About 1% of the mass of the hydrogen atoms does not become helium atoms. It changes to _____.
10. Anything that becomes hot enough gives off _____.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
_____ 1. fuse	a) give the sun its energy
_____ 2. fusion reactions	b) nearly four times heavier than hydrogen
_____ 3. hydrogen	c) about 90% of the sun
_____ 4. sun	d) join
_____ 5. helium	e) a star