

## Quick Lab

**Modeling Fusion** Chapter 29.1**MATERIALS**

- six coins
- marker or wax pencil

**PROCEDURE**

1. Mark six coins by using a marker or wax pencil. Put a *P* for "proton" on the head side of each coin and an *N* for "neutron" on the tail side of each coin.
2. Place two coins P-side up. These two protons each represent hydrogen's simplest isotope, H. Model the fusion of these two H nuclei by placing them such that their edges touch. When they touch, flip one of them to be N-side up. This flip represents a proton becoming a neutron during fusion. The resulting nucleus, which consists of one proton and one neutron, represents the isotope hydrogen-2,  ${}^2\text{H}$ .
3. To model the next step of nuclear fusion, place a third coin, P-side up, against the  ${}^2\text{H}$  nucleus from step 2. This forms the isotope helium-3, or  ${}^3\text{He}$ .
4. Repeat steps 2 and 3 to form a second  ${}^3\text{He}$  nucleus.
5. Next, model the fusion of two  ${}^3\text{He}$  nuclei. Move the two  ${}^3\text{He}$  nuclei formed in step 3 so that their edges touch. When the two  ${}^3\text{He}$  nuclei touch, move two of the protons in the two  ${}^3\text{He}$  nuclei away from the other four particles. These four particles form a new nucleus: helium-4, or  ${}^4\text{He}$ .

**ANALYSIS**

1. Large amounts of energy are released when nuclei combine. How many energy-producing reactions did you model?

2. Create a diagram that shows the formation of  ${}^4\text{He}$ .