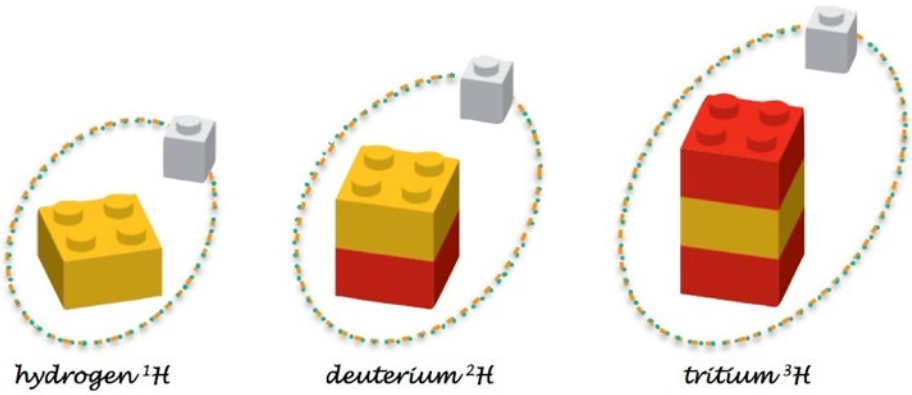
Explore fusion reactions

In this activity you will be using LEGO bricks to explore different nuclei and some fusion reactions.

You will need:
A selection of square LEGO bricks in red and yellow.

All matter is made out of atoms, and all atoms have a central nucleus made up of protons and neutrons. Usually, electrons flit around the nucleus, but when fusion occurs the electrons have been stripped away so we only need consider the nuclei. For this activity, yellow bricks represent protons (p) and red bricks are neutrons (n).

Here are some of the most basic nuclei - three varieties (called isotopes) of hydrogen.



The table below shows how these different hydrogen nuclei are built up, plus two varieties of helium.

element/isotope	label	nucleus composition
hydrogen	^{1}H or just H	1 proton
deuterium	^{2}H or D	1 proton, 1 neutron
tritium	^{3}H or T	1 proton, 2 neutrons
helium-3	^{3}He	2 protons, 1 neutron
helium-4	^{4}He	2 protons, 2 neutrons

Investigate: Start with two nuclei. Break them apart and rearrange the LEGO bricks to make two new nuclei. Remember that both the proton and neutron can exist on their own. Using combinations of the nuclei listed above, can you find five different fusion reactions with two starting nuclei and two or more products?
Here's an example: D + D ⇒ ^{3}He + ?