

Nuclear Physics - More Fission and Fusion

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More Fission Related Issues

As you may know a serious problem with Fission is that it produces waste products that have an abundance of neutrons making them also unstable - radioactive. Whilst these can in some cases be used, eg as medical tracers, many have long half lives and are often extremely radioactive.

When material is removed from the 'core' it is extremely hot, so is placed in large cooling ponds - using remote techniques - no one wants to get near obviously. When it is cool enough the products are sealed until the activity has fallen to make them safe. These containers are placed away from people in places where their impact is minimal. In reality though many people wonder if such a place exists...

Fusion

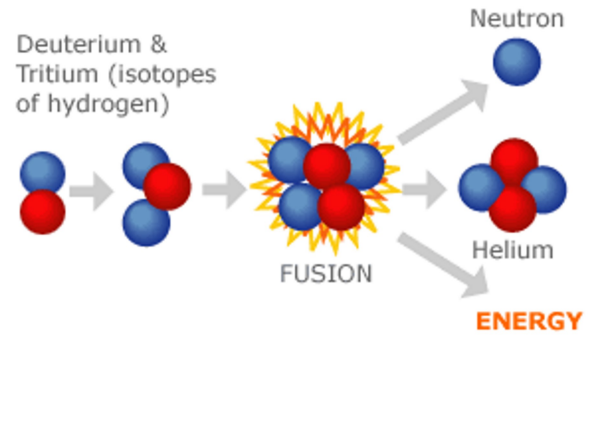
Now this would be a fab thing....

Two light nuclei combine together to create a heavier nucleus. Energy is released because the average nucleon binding energy is larger for the heavier nucleus.

Stars are powered by fusion. For example two isotopes of hydrogen:



Another example, again with two isotopes of hydrogen:

 <p>The diagram illustrates the fusion process. On the left, two hydrogen isotopes, Deuterium (one red proton, one blue neutron) and Tritium (one red proton, two blue neutrons), are shown. An arrow points to a central point labeled 'FUSION' where the nuclei are merging, surrounded by a yellow and orange energy burst. From this point, two arrows point to the products: a Helium nucleus (two red protons, two blue neutrons) and a Neutron (one blue neutron). The word 'ENERGY' is written in orange below the Helium nucleus.</p>	<p>There are strong repulsive forces which need to be overcome to cause the nuclei to get close enough for the strong force to cause them to become attracted together.</p> <p>Typically you might need 1MeV - which is a lot.</p> <p>A problem has been to make these nuclear reactions sustainable - in theory enough energy is produced to do this - after all, stars continue to shine - so it is clearly possible. The dream has been just that - a dream.</p>
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A recent report has stated the first fusion reactor is scheduled for the 2030-2040. And fusion will not produce dangerous waste products, or CO₂. So its a promising idea....

<https://www.iter.org/proj/inafewlines>

<https://www.nbcnews.com/mach/science/long-wait-fusion-power-may-be-coming-end-ncna833251>