

One of the pathways for hydrogen fusion involves the following reaction:



1. How much kinetic energy does a deuterium nucleus need to fuse with a tritium nucleus? *Note: for a course-grained approximation, you may assume that the tritium is fixed in position and the deuterium speeds toward it.*
2. If the deuterium is in a gas, what temperature should the gas be so that most deuterium has enough kinetic energy for fusion?
3. **Extra** Based on the masses of deuterium (${}^2\text{H}$) and tritium (${}^3\text{H}$), and given that one neutron will be produced, how much energy will be generated when they fuse?

isotope	mass
${}^2\text{H}$	2.0141 u
${}^3\text{H}$	3.01605 u
${}^4\text{He}$	4.0260 u
${}^1_0\text{n}$	1.0087 u

4. **Extra** What mass of deuterium + tritium would need to be fused to provide the electrical power the United States uses in a day?¹

¹The electrical power use of the US is about 10^{12} J/s.