**Vocabulary: Nuclear Reactions**

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**Vocabulary**

* Chain reaction – a sequence of reactions where the product of the reaction is also a reactant. As the reaction proceeds, the reaction rate increases as more reactive products are generated.
  + Nuclear *fission* is an example of a reaction that can trigger a chain reaction.
* Catalyst– a substance that increases the rate of a reaction without being altered by the reaction.
  + Because the catalyst is unchanged by the reaction, it can be recovered from the reaction and reused.
* CNO cycle – the carbon-nitrogen-oxygen cycle is the sequence of nuclear *fusion* reactions that occurs in stars bigger than the sun.
  + In the CNO cycle, protons are added to carbon-12 to create nitrogen-15. The addition of one more proton results in a helium-4 atom and a carbon-12 atom.
  + The CNO cycle requires temperatures greater than about 15,000,000 K.
* Deuterium – an isotope of hydrogen that contains one proton and one neutron.
* Electron volt – a measurement of energy equal to about 1.6 • 10-19 joules.
  + An electron volt is equal to the energy an electron gains by moving across a voltage of one volt.
  + A megaelectron volt, MeV, is one million electron volts.
* Fission – a *nuclear reaction* in which a large nucleus splits into two or more smaller nuclei.
  + Fission reactions are triggered by the impact of a neutron with a large, radioactive nucleus. More neutrons are released from the fission reaction.
* Fusion – a nuclear reaction where two nuclei combine into a larger nucleus.
* Isotope – one of several forms of the same element.
  + All isotopes of a given element have the same number of protons, but differ in the number of neutrons.
  + Most isotopes are radioactive. Usually only one or two stable isotopes exist for a given element.
* Nuclear reaction – a change in the nucleus of an atom.
  + Examples of nuclear reactions include nuclear decay, fission, and fusion.
  + Most nuclear reactions result in the emission of energy.
* Positron – the positively charged antimatter counterpart of an electron.
  + If a positron meets an electron, the two particles will annihilate one another in a burst of gamma rays.
* Positron emission – a nuclear reaction that involves that creation of a positron and a neutron from a proton.
* Proton – a positively charged particle located in the nucleus of an atom.
  + Protons have slightly less mass than neutrons.
  + The number of protons determines the element.
* Proton-proton chain – the set of fusion reactions that occurs in stars like the sun.
  + In the proton-proton chain, hydrogen nuclei are fused to form helium nuclei.
  + The proton-proton chain requires temperatures greater than about 4,000,000 K.