

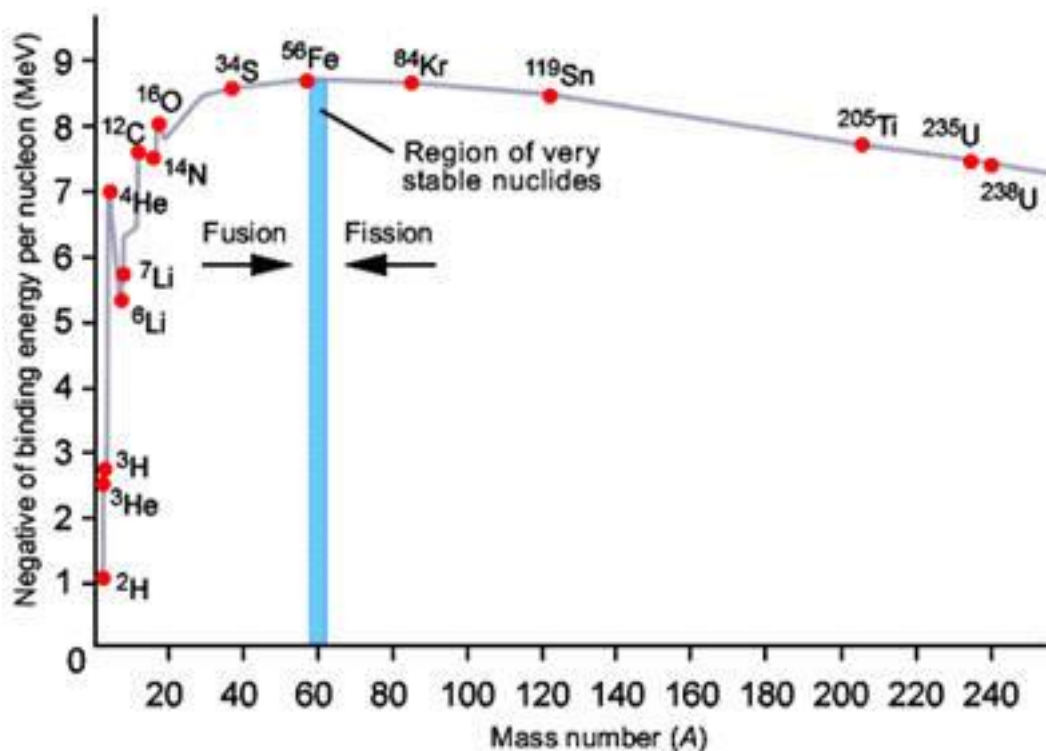
Answer on Question #45877, Physics, Astronomy | Astrophysics

Question:

Explain why elements heavier than iron can not form as a result of thermonuclear fusion reaction in nucleosynthesis. Discuss s- and r- processes for the formation of elements heavier than iron.

Answer:

Elements higher than iron cannot be formed through fusion as one have to supply energy for the reaction to take place.



In a supernova, especially a core collapse supernova, huge quantities of new nuclei are synthesized, very quickly, in the nuclear reactions triggered by the flood of neutrons. This 'r process', as it is called produces most of the elements heavier than the iron group (copper to uranium), directly or by radioactive decay of unstable isotopes produced directly.

The s-process or slow-neutron-capture-process is a nucleosynthesis process that occurs at relatively low neutron density and intermediate temperature conditions in stars. Under these conditions heavier nuclei are created by neutron capture, increasing the atomic weight of the nucleus by one. A neutron in the new nucleus decays by beta-minus decay to a proton, creating a nucleus of higher atomic

number. The rate of neutron capture by atomic nuclei is slow relative to the rate of radioactive beta-minus decay, hence the name.

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