



Stellar Nucleosynthesis

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Stellar nucleosynthesis is the process by which stars **create the elements inside their cores**. The only element **not formed in this way is hydrogen**, the most abundant and lightest element in the universe.

- Stellar cores have crushing pressures and temperatures, reaching up to **15 million °C** in the Sun's core. In these harsh conditions, the nuclei of atoms undergo **nuclear fusion**.
 - The **hydrogen nucleus**, which is just one proton, comes together to form **helium nuclei (two protons and two neutrons)** in the p-p (proton-proton) process.
 - In more massive stars, the **carbon-nitrogen-oxygen (CNO) cycle dominates**, where the nuclei of these elements come together in different ways to form **elements from helium onwards**.
 - CNO cycle involves hydrogen fusing into helium, catalysed by carbon, nitrogen, and oxygen isotopes.
 - As a star runs out of nuclei to fuse, its core contracts, increasing the temperature and triggering further nuclear fusion.
 - This process continues until the **star starts producing iron**, the lightest element for which fusion consumes more energy than it releases.
 - Elements heavier than iron can only be synthesised outside a star when it goes **supernova**.

Read More: [Nuclear Fusion Energy](#)

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