

## 1.1: The origin of elements and their distribution

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All substances in the universe are made of elements. According to the current generally accepted theory, hydrogen and helium were generated first immediately after the Big Bang, some 15 billion years ago. Subsequently, after the elements below iron ( $Z = 26$ ) were formed by nuclear fusion in the incipient stars, heavier elements were produced by the complicated nuclear reactions that accompanied stellar generation and decay.

In the universe, hydrogen (77 wt%) and helium (21 wt%) are overwhelmingly abundant and the other elements combined amount to only 2%. Elements are arranged below in the order of their abundance,

$${}^1_1H > {}^4_2He > {}^{16}_8O > {}^{12}_6C > {}^{20}_{10}Ne > {}^{28}_{14}Si > {}^{27}_{13}Al > {}^{24}_{12}Mg > {}^{56}_{26}Fe$$

The **atomic number** of a given element is written as a left subscript and its **mass number** as a left superscript.

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