

Nuclear Systematics: I. Solar Abundance of the Elements

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Nuclear systematics and the abundance of elements and isotopes in meteorites, in planets, in the solar photosphere, in the solar wind, and in solar flares are used to estimate the abundance of elements in the Sun. The results indicate that ^{56}Fe , the decay product of doubly-magic ^{56}Ni , is the Sun's most abundant nuclide. The next most abundant nuclide is the doubly-magic ^{16}O . The most abundant elements - Fe, Ni, O, Si, S, Mg, and Ca - are the even- Z elements that HARKINS¹ found to comprise $\approx 99\%$ of ordinary meteorites. The least abundant elements have loosely bound nucleons - Li, Be and B - further confirming the proposed link¹ between abundance and nuclear structure, with one conspicuous and important exception. Diffusion enriches light-weight nuclides at the solar surface, hiding the link of abundance to nuclear stability beneath the Sun's H-rich exterior.