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^{17}O destruction rate

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When stars approach the red giant branch, a deep convective envelope develops and the products of the CNO cycle appear at the stellar surface. In particular, the ^{17}O is enhanced in RGB and AGB stars. Then, spectroscopic analyses of O isotopic ratios of these stars provide a powerful tool to investigate the efficiency of deep mixing processes, such as those powered by convective overshoot, rotation, thermohaline instability, gravity wave and magnetic field. However, this method requires a precise knowledge of the reaction rates that determine the ^{17}O abundance in a H-burning shell, among which the $^{17}\mathrm{O}(\mathrm{p},\gamma)^{18}\mathrm{F}$ and the $^{17}\mathrm{O}(\mathrm{p},\alpha)^{14}\mathrm{N}$ reactions are the more relevant. Since the last release of rates compilations (see the JINA reaclib database) a number of experiments have updated the reaction rates, incorporating new low-energy cross-section measurements. To provide up-to-date input to the astrophysics community, we performed simultaneous multi-channel and Monte Carlo R–matrix analyses of the two reactions including all newly available data, resulting in realistic uncertainty ranges for the rates.

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