Erratum: Nonthermal nuclear reactions induced by fast α particles in the solar core [Phys. Rev. C 91, 028801 (2015)]

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On p. 4 of the original paper, a simplified method was used to estimate the influence on the ^{17}O number density $n_{^{17}\mathrm{O}}$ in the solar core of fast α particles generated in the $^7\mathrm{Li}(p,\alpha)\alpha$ reaction. The estimation was based on an analysis of the rate equation for $n_{^{17}\mathrm{O}}$, Eq. (13), neglecting or allowing for the term $R_{\alpha\,^{14}\mathrm{N,nonth}}$, Eq. (8), that is the nonthermal $^{14}\mathrm{N}(\alpha,p)\,^{17}\mathrm{O}$ reaction rate provided by the $p+{}^7\mathrm{Li}$ α particles. At steady state, this equation takes a form of an algebraic balance equation for which it was not difficult to determine the ^{17}O number density enhancement $\delta_{^{17}\mathrm{O}}$ caused by the term $R_{\alpha\,^{14}\mathrm{N,nonth}}$.

However, in our later study [1] it was suggested that the algebraic method may not provide high accuracy for $\delta_{^{17}\mathrm{O}}$ as it does not directly operate with solar reaction kinetics controlling built-up and burn-up of carbon-nitrogen-oxygen (CNO) elements. Therefore, a more accurate evaluation of $\delta_{^{17}\mathrm{O}}$ has been performed by solving a system of rate equations for the CNO cycle using a nucleosynthesis code [2]. This code relies on a thermal reaction network, so the nonthermal reaction α (fast) $+\,^{14}\mathrm{N}\to p+{}^{17}\mathrm{O}$ which can increase the ^{17}O abundance has been incorporated in the network. As in Ref. [1], the code was run at constant temperature and density corresponding to several selected radii $R/R_\odot$. The improved values of $\delta_{^{17}\mathrm{O}}$ together with the previous ones are given in Table I.

TABLE I. The $\delta_{^{17}\mathrm{O}}$ values for different distances $R/R_\odot$ from the center of the Sun. Both present and previous results are shown.

	$\delta_{^{17}\mathrm{O}}$	
$R/R_\odot$	Present	Previous
0.1	2	2
0.2	4	24
0.25	22	155
0.3	2	

It is seen that the previously found ^{17}O abundance enhancement of 2–155 is reduced to 2–22, and in the outer core $\delta_{^{17}\mathrm{O}}$ decreases by a factor of 6 to 7. These results are in good agreement with those in Ref. [1] obtained for an α-particle slowing down model based on the Fokker-Planck scattering theory. It is worth noting here that this model gives the energy-loss rate dE_α/dt of fast α particles close to the rate dE_α/dt provided by a standard binary-collision model with a Debye cutoff employed in the original paper. A comparison of these rates is presented in Ref. [1].

The other results of the original paper remain unchanged.

[1] V. T. Voronchev, Y. Nakao, and Y. Watanabe, J. Phys. G: Nucl. Part. Phys. **44**, 045202 (2017).
[2] The code is available at http://cococubed.asu.edu/code_pages/burn_hydrogen.shtml.

