CNO ABUNDANCES IN RED GIANT STARS

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High-resolution scans of the [O I] $\lambda$6300 line and of the lines of the red CN (2,0) band and very-narrow-band-index measurements of the $C_2$ Swan (0,1) band head have been obtained for about 30 G8-K3 III stars and CNO abundances have been derived from these data. The analysis was performed by means of a grid of model atmospheres and synthetic-spectrum calculations. The effective temperatures were obtained from a new calibration of near-infrared colours and the surface gravities from a calibration of the CaII K-line emission widths. The errors in the resulting CNO abundances are typically 0.1-0.2 dex for [C/O] and [O/H] and 0.2-0.3 dex for [N/H]. Important error contributors are errors in $T_{\text{eff}}$ and log g and, for [N/H], observational errors, uncertain physical data for the CN molecule and possible effects from inhomogeneities in the stellar atmospheres. The abundance results verify the general result of Lambert and Ries (1981) that nitrogen enrichments and carbon depletions have occurred in most giants as compared with main-sequence stars. This is interpreted as the result of CNO processing and some "non-classical" mixing of the star in the main-sequence phase. Discrepancies between our results and those of Lambert and Ries are mainly the consequence of different effective-temperature scales. The C/N ratio is found to be significantly greater for stars of Intermediate Pop. II (i.e., stars with relatively small masses) than for more metal-rich stars. Also, the O/Fe ratio is found to be greater for the metal-poor stars, while it is close to solar for the rest of the sample. These tendencies, and their significance, are discussed as possible consequences of stellar and galactic evolution in a forthcoming paper in Astronomy & Astrophysics, where also details of this investigation are to be presented.