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Calibrating the metallicity of M dwarfs in wide physical binaries with F-, G-, and K-primaries - II: Carbon, oxygen, and odd-Z iron-peak abundances of the primary stars

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Abstract

Detailed chemical composition of stars is of prime interest for a range of topics in modern stellar astrophysics, such as the chemical evolution of the Galaxy or the formation, composition, and structure of exoplanets. In this work, we derive the C and O abundances and update Sc, V, Mn, and Co abundances considering hyperfine structure effects (HFS) and correcting for non-local thermodynamical equilibrium (NLTE) for a sample of 196 late-F, G-, and early-K stars with wide resolved M-dwarf companions. We accomplished this by employing the equivalent width (EW) method and high-resolution spectroscopic data. Furthermore, we investigated the distributions of [X/Fe] ratios and [C/O] as a function of metallicity ([Fe/H]) and kinematic population. The observed trends are consistent with previous findings reported in the literature. Additionally, we searched for confirmed exoplanets around our primary stars in the literature and found 24 exoplanets in 17 systems, while none of the M-dwarf companions in our sample presented confirmed exoplanets. In conclusion, our study provides homogeneous abundances from high-resolution spectra for a large sample of FGK primary stars, paving the way for further research on stellar abundances of the M secondaries and exoplanetary science.

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