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Title:High-resolution absorption spectroscopy of the OH π ; $\nu=3/2$ ground state line

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Abstract:The chemical composition of the interstellar medium is determined by gas phase chemistry, assisted by grain surface reactions, and by shock chemistry. The aim of this study is to measure the abundance of the hydroxyl radical (OH) in diffuse spiral arm clouds as a contribution to our understanding of the underlying network of chemical reactions. Owing to their high critical density, the ground states of light hydrides provide a tool to directly estimate column densities by means of absorption spectroscopy against bright background sources. We observed onboard the SOFIA observatory the π ; $\nu=3/2$, $J = 5/2 \leftrightarrow 3/2$ 2.5 THz line of ground-state OH in the diffuse clouds of the Carina-Sagittarius spiral arm. OH column densities in the spiral arm clouds along the sightlines to W49N, W51 and G34.26+0.15 were found to be of the order of 10^{14} cm $^{-2}$, which corresponds to a fractional abundance of 10^{-7} to 10^{-8} , which is comparable to that of H $_2$ O. The absorption spectra of both species have similar velocity components, and the ratio of the derived H $_2$ O to OH column densities ranges from 0.3 to 1.0. In W49N we also detected the corresponding line of $\nu=18$ OH. © 2012 ESO.

Number of references:32

Main heading:Ground state

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Uncontrolled terms:Chemical compositions - Column density - Critical density - Gas phase chemistry - High resolution - Hydroxyl radicals - Interstellar mediums - ISM : clouds - ISM: lines and bands - ISM: molecules - States of light - Underlying networks - Velocity components

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