

Silicon and Sulphur Chemistry in the Inner Envelopes of Carbon Stars

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The chemistry of silicon-, sulphur-, and oxygen-bearing molecules is investigated in the inner envelope of a typical carbon-rich AGB star. The effect of pulsation-driven shocks on the gas close to the stellar photosphere is considered. The chemistry is governed by bimolecular and termolecular reactions between neutrals. Thermal equilibrium calculations predict small amounts of SiS and SiO molecules in stellar photospheres for C/O ratios characteristic of carbon stars. On the other hand, radio maps show that these molecules are present with large abundances close to the star. Our model predicts the formation of SiS and SiO in the periodically shocked inner regions and shows that the inner envelope of an AGB star is a region of very active molecule formation.