DETECTION OF THE CCP RADICAL ($X^2\Pi_r$) IN IRC+10216: A NEW INTERSTELLAR PHOSPHORUS-CONTAINING SPECIES

D. T. HALFEN, *Steward Observatory, University of Arizona, Tucson, AZ, 85721*; D. J. CLOUTHIER, *Department of Chemistry, University of Kentucky, Lexington, KY, 40506*; and L. M. ZIURYS, *Department of Chemistry, Department of Astronomy, and Steward Observatory, University of Arizona, Tucson, AZ, 85721*.

The CCP radical ($X^2\Pi_r$) has been detected in the circumstellar gas of IRC+10216, the fifth phosphorus-bearing molecule identified in interstellar space. Four rotational transitions of this species were observed using the Arizona Radio Observatory (ARO) 12m telescope on Kitt Peak at 2 and 3 mm. Each transition consists of lambda-doublets, which are well-separated in frequency in IRC+10216; five of these eight possible lines of CCP were clearly detected, while the remaining three were contaminated by stronger emission from other species. The column density derived for CCP was N_{tot} = 1x10^{12} cm^{-2} and T_{rot} = 21 K. Modeling of the line profiles suggests that CCP arises from an extended shell with a maximum radius of 40". The abundance of this radical, relative to H_2, is f = 1x10^{-9} - roughly comparable to that of PN and CP in this source. CCP may be produced from radical-radical reactions of CP, or ion-molecule chemistry involving P^+ and HCCH. The identification of CCP is additional evidence that phosphorus chemistry is active in carbon-rich circumstellar gas.