Formation of the negative molecular ion MH- by radiative association of a neutral molecule M with H- 

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We consider the formation of negative molecular ions MH- through the reaction of radiative association: M+H− → MH− + ?ω, where M is a diatomic or triatomic neutral molecule. We present a theoretical approach to calculate the cross-section and the rate constant for the reaction and apply the theory to study formation of molecular ions from H− and neutral molecules abundant in the interstellar medium (ISM): We consider H2, CO, and H2O as possible candidates to form negative ions. Such ions have never been observed in the ISM. Their eventual observation would serve as a proof of presence of H− in the ISM too. The H− ion cannot be detected directly by the photoabsorption spectroscopy. Supported by Triangle de la Physique contract QCCM and the National Science Foundation grant PHY-0855622