

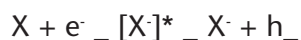
## DO NEGATIVE IONS EXIST IN INTERSTELLAR ENVIRONS?

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Astrophysical research into interstellar clouds and circumstellar envelopes has led to the detection of 120 molecules in these environs, including members of the series' C<sub>n</sub>H, C<sub>n</sub>H<sub>2</sub> and C<sub>n</sub>O. Mass spectrometry has been extremely useful in the generation of some of these unusual "non-terrestrial" species in the laboratory. Interestingly, no negatively charged species have been detected in the interstellar medium (ISM) thus far. Conditions in the ISM allow for the formation of negative ions by radiative attachment (Scheme 1), the initial excited anion [X-]\* can radiate its excess energy to form a stable negative ion.

### Scheme 1



Theoretical and experimental investigation of the series' C<sub>n</sub>H, C<sub>n</sub>H<sub>2</sub> and C<sub>n</sub>O demonstrate some significant trends with increasing chain length. Particularly notable is the increase in the adiabatic electron affinity with increasing n raising the possibility of efficient radiative attachment of a thermal electron in the gas phase. *Ab initio* calculations carried out suggest that the corresponding C<sub>n</sub>H<sup>-</sup>, C<sub>n</sub>H<sub>2</sub><sup>-</sup> and C<sub>n</sub>O<sup>-</sup> anions are potentially interstellar species. These results will be discussed along with relevance to their interstellar detection.

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