

MUONS AND MUONIUM IN MOLECULAR PHYSICS

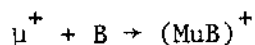
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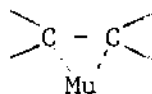
The aim of this experiment is to gain some insight on the most fundamental processes involved in the reaction of muons and muonium with organic molecules. Two components of the  $\mu$ SR signal in an organic sample can be identified: a diamagnetic fraction precessing at (or very close to) the Larmor frequency and a paramagnetic fraction giving rise to frequencies characteristic of the muon's coupling with an unpaired electron spin.

Diamagnetic fraction: we intend to study the occurrence of an acid-base reaction of the type:



and its competition with reactions that produce muonium. The best suited model systems for this process are aqueous solutions in which muon and electron scavengers, or anionic bases, in high concentration can be added. In order to further distinguish between different types of  $(\text{MuB})^+$  species the chemical shifts of these products will be studied.

Paramagnetic fraction: Work will continue on muonic radicals formed by muonium addition at a carbon-carbon or carbon-oxygen double bond, especially where the corresponding protonic radicals are unknown in ESR work. We intend also to study the possibility of muonium bridging e.g.



Radicals formed by addition at triple bonds will also be studied.

The experiment will make use of the facilities provided by the  $\mu$ SR collaboration (SC 65, 76, 81, 82). In particular, precision frequency measurements will be performed on the SC proton hall spectrometer while precise determination of the amplitudes of different signals will be done with the wire-chamber spectrometer in the SC neutron hall.

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