DISSOCIATIVE RECOMBINATION OF CH_2^+

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In order to understand the carbon chemistry in interstellar molecular clouds, and explain how complex carbon-containing molecules can be formed, the dissociative recombination (DR) of hydrocarbon ions with electrons has to be examined. Especially important is to study the product branching ratios of these processes. We have studied dissociative recombination of CH_2^+ in the ion storage ring CRYRING at the Manne Siegbahn Laboratory in Sweden. The absolute cross section was measured for relative energies from <0.001 to 60 eV, and an E^{-1} energy dependence was found for collisional energies up to 1 eV. This indicates that the direct DR process is dominant. The thermal rate coefficient is found to be 6.5 10^{-7} cm^3s^{-1} at room temperature. This is a higher rate then what was measured by Mul et al[1]. For the first time, DR branching ratios of CH_2^+ were measured, and in contradiction to all previous theoretical studies[2,3], the dominating channel was found to be C+H+H and not CH+H. At 0 eV collision energy the following branching ratios were obtained:

$CH_2^+ + e \rightarrow$	$C + H_2$	$\alpha = 013 \pm 0.05$
	$CH + H$	$\beta = 0.25 \pm 0.07$
	$C + H + H$	$\gamma = 0.62 \pm 0.15$

References

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2 D. Bates., Ap. J., 306, 46, (1986)
3 T. J. Millar et al., Astron. Astrophys. 194, 250, (1988)