The hydrated electrons (\(e_{aq}^-\)) formed in water radiolysis react with \(\text{ethyl propionate}\) with a rate parameter of \(7.5 \times 10^7 \text{ mol}^{-1} \text{ dm}^3 \text{ s}^{-1}\). The electron adduct in acidic solutions immediately (<100 ns) dissociates, yielding \(\text{CH}_3\text{CH}_2\text{C}=\text{O}\) radical. This process in alkaline solutions is slower, \(k=1.4 \times 10^5 \text{ s}^{-1}\). The hydroxyl radicals abstract H atoms in about 50% from the \(\alpha\)-position of propionate.

INTRODUCTION

The radiation chemistry of compounds containing ester group (\(-\text{C}(\text{O})\text{O}-\)) has importance from the aspect of radiation treatment of polymers (e.g. polyacrylates) or radiation biology (fatty acids, nucleic acids).

There are only a few works on the effect of high energy radiations on simple esters. Mostly aqueous solutions of methyl acetate (MA) were studied: the pulse radiolysis was carried out by Nenadović and Mićić\(^1\); Bernath et al.\(^2\) studied \(\gamma\)-radiolysis. In dilute solutions the intermediates of water radiolysis\(^3\), \(e_{aq}^-\), \(H\), \(OH\) (\(G=2.7, 0.6\) and \(2.7\) molecule/100 ev) induce the chemical trans-
formation of the solute present in low concentration. When investigating the $e_{aq}^-$ reactions, H atoms and OH radicals were usually eliminated by reacting them with tert-butanol (t-BuOH). Studying the reaction of OH radical, $e_{aq}^-$ is converted to OH$^-$ reacting with N$_2$O.

To clarify the radiolytic reactions of simple esters, ethyl propionate (EP) was studied in this work.

**EXPERIMENTAL**

EP (Fluka) was dried by CuSO$_4$ and distilled under Ar atmosphere. t-BuOH was purified by distillation. The pH was adjusted with HClO$_4$ and NaOH, or phosphate buffers. Deaeration was carried out with N$_2$.

Pulse radiolysis with optical detection was performed by the set-up of the Institute of Isotopes with pulse duration of 2.6 µs or 80 ns. The scattered light was reduced by a UG5 filter (transmittance 240-400 nm).

The doses were 10 to 90 Gy/pulse measured by a potassium thiocyanate dosimeter. The absorbances were calculated from the oscilloscope traces and converted to $G\cdot\varepsilon_{\lambda}$, dividing the absorbances by the dose and multiplying by a conversion factor of $9.65\times10^6$ GY (100 eV)$^{-1}$ mol$^{-1}$ dm$^3$ cm$^{-1}$. $\varepsilon_{\lambda}$ is the extinction coefficient at wavelength $\lambda$.

**RESULTS AND DISCUSSION**

**Reaction of hydrated electrons**

To determine the reaction rate parameter of electron capture the first order decay of $e_{aq}^-$ in solutions of EP (0.5-10 mmol dm$^{-3}$) was followed at the maximum of $e_{aq}^-$. 