

What Time-Resolved ESR Tells Us About the Radiolytic Oxidation of Amino Acids in Solution. Gordon L. Hug, Pawel Wisniowski, Ian Carmichael, Richard W. Fessenden, Radiation Laboratory, Univ. of Notre Dame, Notre Dame, IN 46556 USA.

Oxidation of glycine and methylalanine anions: Both aminomethyl ($\cdot\text{CH}_2\text{NH}_2$) and $\text{H}_2\text{N}\cdot\text{CH}\text{-CO}_2^-$ radicals were identified by time-resolved electron spin resonance (TRESR) in the oxidation of glycine anions by $\cdot\text{OH}$ in aqueous solution. Previous ESR measurements had only detected the $\text{H}_2\text{N}\cdot\text{CH}\text{-CO}_2^-$ radical in these systems. The rise times of the ESR lines for these two different radicals are consistent with both the radicals being formed in the initial reaction of $\cdot\text{OH}$ with the glycine anions. A new method was developed for determining radical yields from TRESR measurements. The method was applied to measure the yields of these two C-centered radicals. Relative to the total yield of $\cdot\text{OH}$, their yields are approximately 29% for aminomethyl radicals and 53% for $\text{H}_2\text{N}\cdot\text{CH}\text{-CO}_2^-$ radicals. The relative yield of aminomethyl radicals from methylamine was 53%. No ESR lines attributable to aminyl radicals ($\text{HN}\cdot\text{-CH}_2\text{-CO}_2^-$) could be directly detected in solutions of glycine. However, aminyl radicals were found in the radiolytic oxidation of methylalanine anions (see figure), and they decay via β -scission. The implications of the findings in this work will be discussed in the context of a comprehensive scheme (1998) for the oxidation of glycine anions by $\cdot\text{OH}$.

