Electron Paramagnetic Resonance of Rhyolite and γ-Irradiated Trona Minerals

F. Köksal, R. Köseoğlu[a], and E. Başaran[b]

Physics Department, Faculty of Arts and Sciences, Ondokuz Mayıs University, Samsun, Turkey
[a] Physics Department, Faculty of Arts and Sciences, Niğde University, Niğde, Turkey
[b] Physics Department, Faculty of Arts and Sciences, Gebze HighTechnology Institute, İstanbul, Turkey

Reprint requests to Prof. F. K.; Fax: +90-362-457 6081; E-mail: koksalf@omu.edu.tr

Z. Naturforsch. **58a,** 293 – 298 (2003); received January 2, 2003

Rhyolite from the "Yellow Stone of Nevşehir" and γ-irradiated trona from the Ankara Mine have been investigated by electron paramagnetic resonance at ambient temperature and at 113 K. Rhyolite was examined by X-ray powder diffraction and found to consist mainly of SiO_2. Before γ-irradiation, the existing paramagnetic species in rhyolite were identified as $\dot{P}O_4^{2-}$, $\dot{C}H_2OH$, $\dot{C}O_3^-$, $\dot{S}O_2^-$, $\dot{C}O_3^{3-}$, and $\dot{C}O_2^-$ free radicals and Fe^{3+} at ambient temperature. At 113 K $\dot{S}O_2^-$, $\dot{C}O_3^{3-}$, and $\dot{C}O_2^-$ radicals and Fe^{3+} were observed. The γ-irradiation produced neither new species nor detectable effects on these free radicals. The disappearance of some of the radicals at 113 K is attributed to the freezing of their motions. Before γ-irradiation, the trona mineral shows only Mn^{2+} lines, but after γ-irradiation it indicated the inducement of $\dot{C}O_3^{3-}$ and $\dot{C}O_2^-$ radicals at ambient temperature, 113 K, in addition to the Mn^{2+} lines. The *g* and *a* values of the species were determined.

Key words: Electron Paramagnetic Resonance; Free Radicals; Silicate; Rhyolite; Trona; γ-Irradiation.