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Phase states of the gypsum thermal-annealing derivatives according to electron spin resonance spectra

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Abstract

The electron spin resonance (ESR) spectra of SO_3^- and SO_2^- radical ions with a linewidth $\Delta H \approx 2.7$ G and SO_3^- (A 1) and SO_3^- (A 2) centers with superhyperfine splitting due to the interaction with protons in platelike gypsum single crystals under X-ray irradiation have been analyzed at 25°C. Dehydrated regions with a radius >4 Å are revealed in gypsum. The ESR spectra of SO_3^- radical ions and atomic hydrogen with $\Delta H \approx 0.3$ G are found in the products of isothermal annealing of gypsum kept for 30 min after X-ray irradiation at 25°C. The dependences of the intensities of these spectra on the annealing temperature are studied in the range of 100-450°C. The temperature range of formation of α - and β -phase states of bassanite and γ -anhydrite are determined. The process of residual water redistribution between the channel systems of the α - and β -phase types of $\gamma\text{-CaSO}_4$ in gypsum thermal derivatives is established. © 2014 Pleiades Publishing, Inc.

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