

Evaluation of Mn(II) Framework Substitution in MnAPSO-34 and Mn-impregnated SAPO-34 Molecular Sieves Studied by Electron Paramagnetic Resonance and Electron Spin-Echo Modulation Spectroscopy

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MnAPSO-34 and Mn-impregnated SAPO-34(MnH-SAPO-34) sample were prepared with various manganese contents and studied by electron paramagnetic resonance(EPR) and electron spin-echo modulation (ESEM). Electron spin-echo modulation analysis of 0.065 mol% Mn(relative to P) in MnAPSO-34 with adsorbed D₂O shows two deuterons at 0.246 nm and two at 0.364 nm from Mn. This suggests that two waters hydrate an MnO₄ configuration with a D-O bond orientation for the waters as expect for a negatively charged site at low manganese content (0.065 mol%), but the ESR spectra obtained from MnAPSO-34 and MnH-SAPO-34 samples exhibit the sample parameters ($g \approx 2.01$ and $A \approx 95$ G), but the spectra obtained from MnAPSO-34 samples are better resolved. Three-pulse ESEM of MnAPSO-34 and MnH-SAPO-34 with adsorbed deuterium oxide shows that the local environments of manganese in the hydrated samples are different, suggesting that Mn(II) is framework substituted in MnAPSO-34 since it obviously occupies an extra-framework position in MnH-SAPO-34.

References

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