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Benzene confinement in single-walled carbon nanotubes: inelastic and quasielastic neutron scattering N.R. DE SOUZA, A.I. KOLESNIKOV, N. VERDAL, Argonne National Laboratory, Intense Pulsed Neutron Source, A.P. MORAVSKY, MER Corporation — We characterize experimentally the dynamical properties of benzene confined in single-walled carbon nanotubes (SWNT) of diameter 14 Å. The presence of benzene inside the nanotubes is demonstrated by measuring the small-angle neutron scattering intensities from a properly prepared C_6D_6 benzene – SWNT sample. The incoherent inelastic neutron scattering spectra from C_6H_6 benzene in the nanotubes and in the bulk crystal are measured at 4 K, up to an energy transfer of 130 meV. The effective vibrational density of states reveals a significant redistribution of all intermolecular modes for the confined benzene, whereas the intramolecular modes are nearly unaffected. Incoherent quasielastic neutron scattering spectra from C_6H_6 benzene in the nanotubes were also collected from 9 K to room temperature, at an energy-transfer resolution of approx. 80μeV. The orientational and translational diffusive dynamics of confined benzene are discussed on the basis of these data.

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