Monte Carlo (GCMC) techniques are well suited for this purpose. In this work, we performed GCMC simulations of sorption equilibria of methane, ethane, propane, butane, hexane, cyclohexane, benzene, and toluene in a silicate-1 type zeolite. The results obtained show good agreement with the corresponding experimentally available sorption isotherms and isosteric heats. Further, they indicate that the considered hydrocarbons behave ideally within the zeolite pores, and that each species prefers to locate at different positions within the zeolite pore framework, in harmony with theoretical predictions.