

Hydrogen bond complexes by in situ charge transfer complexation of o- tolidine with picric and chloranilic acids.

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Abstract:

A two new charge transfer complexes formed from the interactions between o-tolidine (o-TOL) and picric (PA) or chloranilic (CA) acids, with the compositions, [(o-TOL)(PA)(2)] and [(o-TOL)(CA)(2)] have been prepared. The (^{13}C) NMR, (^1H) NMR, (^1H) -Cosy, and IR show that the charge-transfer chelation occurs via the formation of chain structures $\text{O}-\text{H}\cdots\text{N}$ intermolecular hydrogen bond between 2NH(2) groups of o-TOL molecule and OH group in each PA or CA units. Photometric titration measurements concerning the two reactions in methanol were performed and the measurements show that the donor-acceptor molar ratio was found to be 1:2 using the modified Benesi-Hildebrand equation. The spectroscopic data were discussed in terms of formation constant, molar extinction coefficient, oscillator strength, dipole moment, standard free energy, and ionization potential. Thermal behavior of both charge transfer complexes showed that the complexes were more stable than their parents. The thermodynamic parameters were estimated from the differential thermogravimetric curves. The results indicated that the formation of molecular charge transfer complexes is spontaneous and endothermic.