...racterization of highly conductive charge-transfer complexes using positron annihilation spectroscopy.

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Abstract:

Molecular charge-transfer complexes of the tetramethylethylenediamine (TMEDA) with picric acid (Pi-OH), benzene-1,4-diol (QL), tin(IV) tetrachloride (SnCl(4)), iodine, bromine, and zinc chloride (ZnCl(2)) have been synthesized and investigated by elemental and thermal analysis, electronic, infrared, Raman and proton-NMR, energy-dispersive X-ray spectroscopy, X-ray powder diffraction and positron annihilation lifetime spectroscopy, and scanning electron microscopy. In this work, three types of acceptors ´-acceptors (Pi-OH and QL), ů-acceptors (iodine and bromine), and vacant orbital acceptors (SnCl(4) and ZnCl(2)) were covered. The results of elemental analysis indicated that the CT complexes were formed with ratios 1:1 and 1:2 for QL, SnCl(4), and ZnCl(2) acceptors and iodine, Pi-OH, and Br(2) acceptors, respectively. The type of chelating between the TMEDA donor and the mentioned acceptors depends upon the behavior of both items. The positron annihilation lifetime parameters were found to be dependent on the structure, electronic configuration, and the power of acceptors. The correlation between these parameters and the molecular weight and biological activities of studied complexes was also observed. Regarding the electrical properties, the AC conductivity and the dielectric coefficients were measured as a function of frequency at room temperature. The TMEDA charge-transfer complexes were screened against antibacterial (Escherichia coli, Staphylococcus aureus, Bacillus subtilis, and Pseudomonas aeruginosa) and antifungal (Aspergillus flavus and Candida albicans) activities.