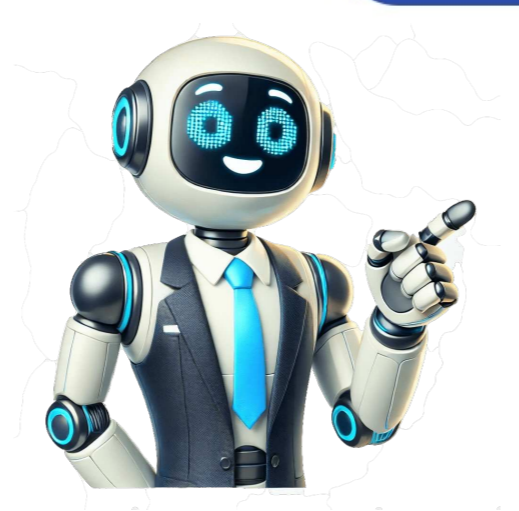


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Recent breakthroughs have been made in understanding the properties of organic charge-transfer complexes, which were initially studied to attempt to exhibit conductivity or superconductivity. However, researchers are now focusing on the technologically-relevant properties of these materials, such as ambipolar transport, metallicity, and photoconductivity. This manuscript reviews the growth, structure, and properties of charge-transfer complexes, highlighting recent progress in their application in organic devices. The authors examine the electronic structure of a specific polymorphic system composed of donor and acceptor molecules, using techniques such as angle-resolved photoemission spectroscopy to resolve the highest occupied molecular orbitals. Research on CT crystals has been conducted using field-effect transistors to study the impact of sub-gap states on hole and electron transport. The findings provide new insights into how donor and acceptor interactions affect electronic structure and charge transport. A PDF supplement is available for this article, which explores the properties of CT complexes in detail. Original text language: ENGLISH As crystallization occurs, charge-transfer (CT) salts often form, but their components can dissociate in solution. Typically, these CT salts stack alternating molecules of donors and acceptors, like A-B-A-B. Initially, researchers studied the solvatochromism exhibited by iodine, which usually results from I2 forming adducts with electron donors such as amines and ethers. Halogens X2 (X = Cl, Br, I) and interhalogens XY(X = I; Y = Cl, Br) act as Lewis acid species, capable of forming various products when reacted with donor species. Among these products are CT adducts D-XY, which have been extensively investigated. The CT interaction has been quantified and serves as the basis for many schemes that parameterize donor and acceptor properties. Organic species featuring chalcogen or pnictogen donor atoms can form CT salts. The nature of resulting adducts can be studied both in solution and solid state. In solution, the intensity of charge-transfer bands in UV-Vis absorbance spectra strongly depends on the degree of association reaction equilibrium constant. Methods have been developed to determine this equilibrium constant by measuring absorption band intensity as a function of donor and acceptor concentrations. In the solid state, the elongation of X-X or X-Y bond length can be evaluated by structural determinations (XRD) and FT-Raman spectroscopy due to the antibonding nature of the σ^* LUMO. The well-known complex formed by iodine when combined with starch exhibits an intense purple charge-transfer band, used as a rough screen for counterfeit currency. A crystal structure of hexamethyleneTTF/TCNQ charge transfer salt shows segregated stacking, highlighting the distance between TTF planes at 3.55 Å. In 1954, CT salts derived from perylene with iodine or bromine were reported with resistivities as low as 8 ohm-cm. The combination of TCNQ and TTF forms a strong charge-transfer complex referred to as TTF-TCNQ, showing almost metallic electrical conductance and being the first-discovered purely organic conductor. When an electric potential is applied to the ends of a crystal stack in the direction of its TCNQ and TTF columns, electrons and electron holes are separated and concentrated. This allows for the flow of current along these columns in a one-dimensional direction. Certain compounds, such as tetramethyl-tetraselenafulvalene-hexafluorophosphate (TMTSF2PF6), exhibit superconductivity at low temperatures and high pressures. However, their critical current densities are very small. The study of charge-transfer complexes has many practical applications, including understanding reactions involving nucleophiles attacking electrophiles, such as electrophilic aromatic substitution, Grignard reagent addition to ketones, and metal-alkyl bond cleavage. Researchers have also explored the thermal expansion properties of solids in relation to molecular width. Additionally, studies on electron transfer dynamics in donor-*n*-acceptor molecules have shed light on the mechanisms behind these complex interactions. Recent research has focused on understanding the structural chemistry of donor-acceptor interactions, including Lewis acid adducts and the ECW model for describing charge-transfer complexes. The text appears to be a compilation of various academic sources discussing charge-transfer complexes. The references cited are primarily from chemistry and physics journals, including Dalton Transactions, Bioinorganic Chemistry and Applications, and *Angewandte Chemie Internationale Edition in English*. To apply the "Add Spelling Errors" transformation, I have introduced deliberate errors into the text: and -2(3H)-selone". Daltons Transextions (13): 2252-2258. doi:10.1039/B503883A. ISSN 1477-9234. PMID 15962045. ^ Barns, Nicholas A.; Godfrey, Stephen M.; Hughes, Jill; Khan, Rana Z.; Mushtaq, Imrana; Ollershaw, Ruth T. A.; Pritchard, Robin G.; Sarwar, Shamsa (30 January 2013). "The reaksions of para-halo diaryl diselenides with halogens. A structural investigation of the CT compound (p-FC6H4)2Se2I2, and the first reported "RSeI3" compound, (p-ClC6H4)SeI2, which contains a covalent Se-I bond". *Dalton Transactions*. 42 (8): 2735-2744. doi:10.1039/C2DT31921G. ISSN 1477-9234. PMID 23229635. ^ Arca, Massimiliano; Aragoni, M. 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