Very strong magnetic superexchange, oxidizing properties, and other peculiarities of Ag(II) compounds

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Chemically bound silver is usually found in the monovalent state (1+), but higher oxidation states (2+,3+) may also be achieved in certain classes of compounds. The divalent state (2+) is unique due to its open-shell $4d^9$ electronic configuration (with one hole in the d set), and the huge electron affinity of ~21.5 eV (in the gas phase), rendering Ag(2+) a potent one-electron oxidizer (Fig.1) [1]. These features affect most physical and chemical properties of the compounds of Ag(2+), leading, *inter alia*, to facile thermal decomposition temperature of its compounds [2], substantial mixing of valence orbitals with those of ligands [3], partial spin transfer and ligand's redox-non-innocence even for fluoride complexes [4], and concomitant strong magnetic superexchange via ligand bridge [5,6].

In this talk I will discuss some of the peculiarities of Ag(2+) compounds with particular emphasis on their magnetic properties and their comparison to those of related oxocuprates(II). I will also describe applications of Ag(2+) compounds in inorganic (Fig.1) and organic chemistry [7], while introducing a novel ambient-teperature C-H bond activation (CHBA) and C-C coupling (CCC) protocol [8].

Fig.1. Illustration of the progres of the ambient-temp. reaction between AgF_2 and $SiCl_4$.

Literature:

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