ARGON MATRIX ISOLATION AND SPECTROSCOPIC CHARACTERIZATION OF COMPLEXES BETWEEN AROMATIC LIGANDS AND TRANSITION METAL ATOMS AND DI- OR TRI-ATOMIC METAL AGGREGATES.

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In the first stage of this work, the co-condensation of chromium metallic vapors and benzene in an argon matrix has demonstrated the existence of a number of complexes involving one, two or three chromium atoms and one or two benzene molecules. These complexes have been identified through their Raman and UV-Visible spectra and by using deuterium/hydrogen substitution. The inter conversion of these complexes may be induced and monitored by using selective photo-irradiations.

In the second part of the study, the reactivity of several PAH Aromatic ligands with iron atoms and di-atomic iron molecules have been studied because of their interest for the astro-physicians community (1). The PAH are actually thought to be responsible for the Unidentified Infrared Bands coming from the Inter-Stellar Medium. A second question to be resolved is the problem of the iron depletion. Some authors (2) assume that a part of the missing Iron could be masked inside Fe-PAH complexes. FTIR investigations of Argon matrices have demonstrated that such neutral complexes are likely to be formed in low temperature dense regions of the ISM. Furthermore, the results strongly suggest that the Iron dimer reacts preferentially with the coronene molecule. When pyrene is used as a PAH ligand, three different complexes may be obtained, with different metal-ligand bonding. Unlike Chromium complexes, Iron compounds do not seem to be sensitive to photo-irradiation; but careful annealing may induce some evolution of them.

Studies involving naphtalene as a PAH are planed for the next future in order to compare the results with those obtained by P.BOISSEL in ion-trapped experiments concerning cationic iron-naphtalene complexes.

1- A.KLOTZ, G.SERRA, P.BOISSEL, J.MASCETTI, J.DEROUAULT, B.CHAUDRET, et al Planetary & Space Science, 1996, 44, 957
2- B. CHAUDRET et al. New J. Chem. 1991,15,791.