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Conceptual Problems in Main Group Chemistry

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During our past work numerous issues concerning bonding situations in main group compounds were encountered that will be highlighted in this talk. Problems to be addressed include:

(i) The steric activity of free valence electron pairs.
(ii) The role of semi-ionic, multi-center bonding in complex fluorides, oxofluorides, and compounds containing sterically active free valence electron pairs.
(iii) How the replacement of fluorine ligands in pentagonal bipyramidal heptafluorides by either doubly bonded oxygen ligands or free valence electron pairs influences the overall bonding.
(iv) The difficulty of describing in the N_5^+ cation the bonding and charge distribution derived from the experimental data, with resonance structures that satisfy the octet rule.