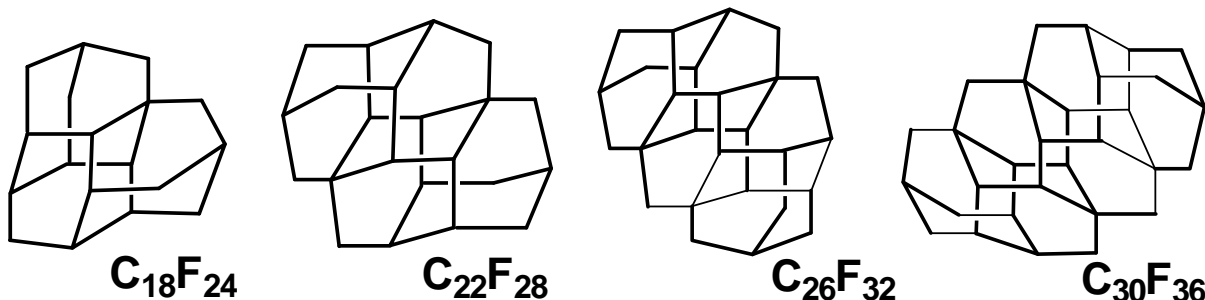


Research in Fluorine Chemistry

The research area of Professor Jamie L. Adcock concerns the synthesis novel fluorinated molecules, among these are the syntheses of perfluorinated diamondoid molecules. We have recently synthesized perfluorotriamantane ($C_{18}F_{24}$) and will soon synthesize tetra-, penta- and hexamantanes:



These beautiful molecules provide the opportunity to study several unique features. Space filling models show a surface completely shielded by fluorines. F-triamantane is highly soluble in perfluorinated solvents and indeed is “fluoroscopic” in that it has a high affinity for fluorinated vapors and deliquesces. Being large cages they offer the opportunity to study electron capture and loss in saturated systems. Perhaps the most intriguing aspect is that diamonds have among the highest refractive indices of any crystal, while fluorocarbons have among the lowest. What optical behavior can be expected where a diamond core is “mated” with a perfluorinated skin. The Fluorine and Carbon NMR should also present some interesting patterns and coupling. Unique properties, both physical and spectroscopic, abound with these molecules, each having never been synthesized previously.

REPRESENTATIVE PUBLICATIONS

“Electron Capture-Atmospheric Pressure Photoionization Mass Spectrometry: Analysis of Fullerenes, Perfluorinated Compounds, and Pentafluorobenzyl Derivatives”, Liguang Song*, Amber D. Wellman, Huifang Yao, and Jamie L. Adcock, *Rapid Communications in Mass Spectrometry*, 2007, **21**, 1343-1351.

“Highly Fluorinated Adamantanols; Synthesis, Acidities, and Reactivities,” Adcock, James L. and Zhang, Huqiu, *J. Org. Chem.*, **1996**, *61*, 5073-5076.

“Perfluorinated Stellanes: The Synthesis of Perfluorinated Bisnoradamantane; Long-range ^{19}F NMR Virtual Coupling,” Adcock, James L. and Zhang, Huqiu, *J. Org. Chem.*, **1996**, *61*, 1975-1977.

“Polarized C–H Groups as Novel Hydrogen Bond Donors in Hydryl-F-alkylesters, Unequivocal Examples of the Pinchas’ Effect,” Adcock, James L. and Zhang Huqiu, *J. Org. Chem.*, **1995**, *60*, 1999-2000.

“Synthesis and Photochemical Reactions of Perfluorinated Carbonyl Containing Adamantane Derivatives,” Adcock, James L. and Luo, Huimin, *J. Org. Chem.*, **1994**, *59*, 5883-5885.

“Selective Synthesis and Structure Determination of $C_{60}F_{48}$,” Gakh, Andrei A.; Tuinman, Albert A.; Adcock, James L.; Sachleben, Richard A.; Compton, Robert N.; *J. Amer. Chem. Soc.*, **1994**, *116*, 819-820.

“Aerosol Direct Fluorination: A Developing Synthesis Technology, An Entry Level Mechanistic Tool, A Short Review,” J. L. Adcock and M. L. Cherry, *Industrial & Engineering Chemistry Research*, **1987**, *26*, 208-215.